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Illustration of Bank Swallow by Louis Agassiz Fuertes

COMMON BIRDS
of
TOWN AND COUNTRY

NATIONAL GEOGRAPHIC SOCIETY

LABORATORY OF ORNITHOLOGY
CORNELL UNIVERSITY
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COMMON BIRDS OF TOWN AND COUNTRY

With 114 Illustrations in Color and 52 in Black and White

This book contains the following reprints from the NATIONAL GEOGRAPHIC MAGAZINE:

"**Birds of Town and Country,**" by Henry W. Henshaw, with drawings by Louis Agassiz Fuertes, May, 1914

"**Fifty Common Birds of Farm and Orchard,**" by Henry W. Henshaw, with drawings by Louis Agassiz Fuertes, June, 1913

"**Encouraging Birds Around the Home,**" by Frederic H. Kennard, March, 1914

"**Our Greatest Travelers: Birds that Fly from Pole to Pole; Birds that Make 2,500 Miles in a Single Flight,**" by Wells W. Cooke, April, 1911

NATIONAL GEOGRAPHIC SOCIETY
WASHINGTON, D. C., U. S. A.

BIRDS OF TOWN AND COUNTRY

By Henry W. Henshaw

Chief of the Biological Survey

The 64 colored pictures of common birds of the United States, which illustrate the following article by Dr. Henshaw, were prepared especially for the National Geographic Magazine *by the artist-naturalist, Louis Agassiz Fuertes, and represent many months of work by him and by the engraver and printer. As in the June, 1913, number, the* Geographic *printed a collection of 50 birds in colors, also by Louis Agassiz Fuertes, with text by Dr. Henshaw, it has now given its readers, at the cost of many thousands of dollars, a complete pictorial description of the 114 more common birds of our country.*

The Magazine has received so many requests for separate copies of the article printed last year that arrangements have been made for binding substantially in one volume both of the above articles; also the article by Frederic H. Kennard, "Encouraging Birds Around the Home," with 36 illustrations, which was printed in our March, 1914, number, and the original contribution, "Our Greatest Travelers: Birds that Fly from Pole to Pole; Birds that Make 2,500 Miles in a Single Flight," by Wells W. Cooke, in our April, 1911, issue. A limited number of copies of this valuable collection, substantially bound in cloth, may be obtained at the office of the National Geographic Society at $1.00 each (bound in leather, $2.00).

FROM very ancient times birds have appealed to the interest and imagination of mankind. They have furnished themes for innumerable poets, have appeared in many guises in primitive religions, and by their flight inspired the predictions of the soothsayers of old. In these modern and prosaic times birds still continue to interest mankind, and the last decade has witnessed a marked strengthening of the sentiment toward them.

The present interest is direct and personal, and today hundreds of thousands of men and women in various parts of the country, old as well as young, are employing much of their leisure in familiarizing themselves with the birds of their respective localities. In following birds afield, in studying their habits, and listening to their songs, they bring themselves into close touch and sympathy with nature and add new zest to life—a zest, be it noted, which enriches without harm to any creature.

Would that the same could be said of the sportsman who almost invariably is at heart a nature lover, though the primitive instinct to kill is uppermost. Many sportsmen, however, who formerly followed wild creatures only to kill, have abandoned the use of rifle and shotgun, and today are finding greater pleasure in studying and photographing their former quarry than they did in pursuing it with murderous intent. A real interest in living outdoor wild life leads naturally to a love of nature in all her varied manifestations, and this, in all lands and under all circumstances, remains a source of lasting pleasure.

A love of birds from the esthetic side, however, is of comparatively recent development and had little place among primitive peoples, who utilized birds chiefly in two ways—for food and for ornament. Feathers, especially, appealed to them for purposes of adornment, and this barbaric taste has not only survived among civilized races, but in recent years has developed to an extent which threatens the very existence of many of the most beautiful and notable species of birds in various parts of the world. No region is too remote, no forests too deep, no mountains too high to stay the plume-hunter, stimulated by the golden bribe offered by the tyrant Fashion.

Happily, America has taken the lead in an attempt to restrict this craze for feather adornment, which means nothing less than the death of millions of beautiful and useful creatures. Nor are evidences wanting that other countries as well have recognized the gravity of the situation and are preparing to pass pro-

tective laws similar to those recently enacted in this country.

BIRDS ARE THE FARMERS' MOST EFFICIENT ALLIES

While birds appeal to the regard and interest of man from the esthetic side as no other creatures do, there is another and even more important point of view, and it is no doubt true that of late years interest in birds has been greatly stimulated by the discovery that they possess an economic value. Indeed, so great is their value from a practical standpoint as to lead to the belief that were it not for birds successful agriculture would be impossible.

The study of the economic side of bird life and of the relations of birds to the farmer and horticulturist have been greatly stimulated in the United States by Federal aid and supervision, and in no other country in the world have the activities of birds been so carefully investigated with reference to their practical bearing. Under the Biological Survey of the Department of Agriculture, for instance, is a corps of trained men, who study the food of birds by careful examination of the stomachs of specimens killed for scientific purposes. The information thus gained is supplemented by observations in the field, and the result is a large amount of invaluable data illustrative of the economic relations of many kinds of birds. This storehouse of information has been largely drawn upon in the following pages.

OUR COUNTRY IS PARTICULARLY FORTUNATE IN THE NUMBER AND VARIETY OF ITS BIRDS

It would be strange indeed if our land, with its vast extent of territory, its diversified landscape, its extensive forests, its numerous lakes and streams, with its mountains, prairies, and plains, had not been provided by Nature with an abundant and diversified bird life. As a matter of fact, America has been favored with a great variety of birds famed both for beauty and for song. America also possesses certain families, as the humming-birds and wood-warblers, the like of which exist nowhere else in the world.

In considering the many kinds of birds in the United States from the practical side, they may not inaptly be compared to a police force, the chief duty of which is to restrain within bounds the hordes of insects that if unchecked would devour every green thing. To accomplish this task successfully, the members of the force must be variously equipped, as we find they are. Indeed, while the 1,200 kinds of birds that inhabit the United States can be grouped in families which resemble each other in a general way, yet among the members of the several families are marked variations of form and plumage and still greater variation of habits, which fit them for their diversified duties.

As the bulk of insects spend more or less time on the ground, so we find that more birds are fitted for terrestrial service than for any other. Our largest bird family, the sparrows, is chiefly terrestrial, and although its members depend much upon seeds for subsistence they spend no little share of their time searching for insects. They are ably aided in the good work by the thrushes, wrens, certain of the warblers, and many other birds.

Another group is of arboreal habits, and plays an important part in the conservation of our forests, the true value of which we have only recently learned to appreciate. So many insects burrow into trees that a highly specialized class of birds — the woodpeckers — has been developed to dig them out. The bills, tongues, feet, and even the tails of these birds have been cunningly adapted to this one end, and the manner in which this has been done shows how fertile Nature is in equipping her servants to do her bidding.

The bark of trees also forms a favorite shelter for numerous insects, and behold the wrens, nuthatches, warblers, and creepers, with sharpest of eyes and slenderest of bills, to detect our foes and to dislodge them from crack and cranny.

The air is full of flying insects, and to take care of these there are the swallows, swifts, and night-hawks, whose wings and bodies are so shaped as to endow them with the speed and agility necessary to follow all the turns and windings of their nimble insect prey.

The whippoorwills, swift of wing and with capacious mouths beset with bristles, attend to the night-flying insects when most birds are asleep, while the hawks by day and the owls by night supplement the work of other birds and have a special function of their own, the destruction of noxious rodents.

Thus every family of birds plays its own part in the warfare against insects and other foes to man's industry, and contributes its share to man's welfare.

Birds would fall far short of what they accomplish for man were they not the most active of living things. It is curious that the group of vertebrates which live the fastest—that is, have a higher temperature and a more rapid circulation than any other—should be related by descent to a family of such cold-blooded creatures as the reptiles and lizards, which often go without food and hibernate for considerable periods. Very different is it with birds. Few realize the enormous quantity of food required to sustain the energy of these creatures, most of whose waking hours are spent in a never-ending search for food.

In satisfying their own hunger birds perform an important service to man, for notwithstanding the fact that the acreage under cultivation in the United States is larger than ever before, and that the crops are greater, the cost of foodstuffs continually mounts upward. Meanwhile the destruction of farm and orchard crops by insects and by rodents amounts to many millions each year, and if any part of this loss can be prevented it will be so much clear gain.

The protection of insectivorous and rodent-destroying birds is one of the most effective means of preventing much of this unnecessary loss, and the public is rapidly awakening to the importance of this form of conservation. From the farmers' standpoint, such birds as the bobwhite, prairie-chicken, the upland plover, and the other shore birds are worth very much more as insect eaters than as food or as objects of pursuit by the sportsman. This statement applies with especial force to such species as the prairie-chicken, which everywhere in its old haunts is threatened with extinction.

BIRDS CHECK RAVAGES OF DISEASE-CARRYING INSECTS

The value of birds to the farmer is plain enough, but we do not usually think of birds as having any direct relation to the public health. To prove that they do, however, it is only necessary to state that 500 mosquitoes have been found in the stomach of a single night-hawk; that in a killdeer's stomach hundreds of the larvæ of the salt-marsh mosquito have been found, and that many shore birds greedily devour mosquito larvæ. As mosquitoes are known to carry the germs of such serious diseases as dengue fever and malaria, it is evident that by destroying them birds are conferring an important benefit on man. It may be added that not infrequently ticks are eaten by birds, and that the tick responsible for the spread of Texas fever among cattle has been found in the stomach of the bobwhite.

Since birds perform such invaluable service, every effort should be made to protect the birds we now have and to increase their numbers. This can be done in several ways: (*a*) by furnishing nesting boxes for certain species to nest in, as swallows, martins, wrens, woodpeckers, great-crested flycatchers, and others; (*b*) by planting berry-bearing shrubs about the farm or orchard as food for the birds in winter; (*c*) by the establishment of bird santuaries, where birds may be reasonably safe from their natural enemies and be permitted to live and breed in absolute security as far as man is concerned.

Here, again, the National Government, taking the lead, has set apart no less than 64 bird refuges in various parts of the United States. These for the most part are rocky, barren islands of little or no agricultural value, but of very great usefulness in the cause of bird protection. The example thus set is now being followed by certain States, as Oregon and Wisconsin. Several private citizens also have acquired islands for the purpose of making bird preserves of them; others not only prevent the destruction of wild life on their forested estates, but go much farther, and endeavor in various ways to increase the number of their bird tenants.

NEST OF A TROPICAL ORIOLE

The nests of giant tropical orioles, or caciques, in Mexico are pendant structures 3 and 4 feet in length. They are usually built out on the very tips of slender branches, so that they are protected from the attacks of arboreal beasts of prey. Often, as in the above photograph, there is a little subsidiary chamber at the summit, which is used by the male bird as a roosting place when his mate is sitting on the eggs below.

Photos by Dr. C. William Beebe

THE DANDY AMONG BIRDS

The Mexican mot-mot is perhaps the only bird in which the tail-feathers are mutilated by the bird for purposes of decoration after they are full-grown. A portion of the shafts is denuded by the bird, leaving the web at the tips to form a conspicuous racket,

Efforts to protect birds on a smaller scale and to attract them about dwellings, with a view to their close companionship, are worthy of all praise, and such efforts should be far more common in this country than they are at present, particularly as the means involve little trouble or expense. The presence of trees and shrubbery near the house is of itself an open invitation to birds which they are eager to accept, particularly if the shrubbery is not too closely pruned. Birds like thick vines and tangles, in the recesses of which they feel safe from their many enemies. Suet, nuts, and other bird foods, if exposed in conspicuous places, can usually be depended on to attract birds in winter, and often avail to save many lives, especially when snow covers the ground. In summer opportunities to drink and bathe are irresistible attractions to birds and largely increase the number resorting to any given neighborhood.

Last but not least important may be mentioned the element of safety from cats. Birds and cats do not thrive in the same neighborhood.

To awaken interest in the study of our bird neighbors is the chief object of this paper. The free use of colored illustrations to facilitate identification precludes the necessity for long and detailed descriptions. As all the birds illustrating the text are from the brush of the well-known artist, Fuertes, they need no commendation, but may be permitted to sing their own praises.*

* The following birds were pictured and described in the June, 1913, number of the NATIONAL GEOGRAPHIC MAGAZINE: Bluebird, robin, russet-backed thrush, ruby-crowned kinglet, chickadee, white-breasted nuthatch, brown creeper, house wren, brown thrasher, catbird, mocking-bird, myrtle warbler, loggerhead shrike, barn-swallow, purple martin, black-headed grosbeak, rose-breasted grosbeak, song-sparrow, chipping sparrow, white-crowned sparrow, English sparrow, crow blackbird, Brewer's blackbird, Bullock's oriole, meadow-larks, red-winged blackbird, bobolink, common crow, California jay, blue jay, horned lark, Arkansas kingbird, kingbird, nighthawk, flicker, yellow-bellied sapsucker, downy woodpecker, yellow-billed cuckoo, screech-owl, barn-owl, sparrow hawk, red-tailed hawk, Cooper's hawk, mourning dove, ruffed grouse, bobwhite, kildeer, upland plover, black tern, Franklin's gull.

LIST OF BIRDS DESCRIBED AND INDEX

KINGFISHER (Ceryle alcyon).

Length, about 13 inches. Not to be confused with any other American bird.

Range: Breeds from northwestern Alaska and central Canada south to the southern border of the United States; winters from British Columbia, Nebraska, Illinois, Indiana, Ohio and Virginia south to the West Indies, Colombia and Guiana.

The cry of the kingfisher, which suggests a watchman's rattle in vigorous hands, can be mistaken for the note of no other bird; nor, for that matter, is the bird himself likely to be confused with any other species. Whether flying, perched on a branch over a stream, or diving for small fish, our kingfisher is always himself, borrowing none of his peculiarities from his neighbors. Many of his tropical brothers catch insects for a living; but our bird, early in the history of the development of the kingfisher family, discovered that fish were easier to catch and in the long run more filling than insects, and hence renounced the family habit and assumed the role of fisherman. Instead of using a hollow tree as a nest site, the kingfisher has apparently learned a lesson from the sandswallows and excavates a burrow for himself in some sandbank, usually not far from pond or stream; and you may be sure that any pond chosen by him for a haunt is well stocked with fish. The fish he kills are chiefly minnows and of small value, but the bird sometimes makes a nuisance of himself about fish hatcheries, where his skill in catching young food fish often brings him speedy doom.

RED-HEAD (Melanerpes erythrocephalus).

Length, about $9\frac{3}{4}$ inches. Our only woodpecker with red head and broad white wing patch.

Range: From southern Canada to the Gulf Coast and from central Montana, central Colorado, and central Texas to the Hudson and Delaware. Generally resident, but more or less migratory in the southern parts of its range.

This strikingly marked and readily identified woodpecker is common in some localities and entirely wanting in others which apparently are equally well adapted to the bird's needs. Its habits are a combination of woodpecker, jay and flycatcher, and catching insects on the wing is a common habit. Though in general migratory, the bird is apparently indifferent to cold and other weather conditions, and winters wherever food abounds, especially where beechnuts, of which it is very fond, are plentiful. The red-head eats nearly twice as much vegetable food as it does animal, but the latter includes many destructive insects. For instance, it is greatly to its credit that it eats both species of clover beetles, the corn weevil, cherry scale and 17-year cicada. On the other hand, vigorous accusations are not wanting from various parts of the country of damage done by this species. It eats corn on the ear, and attacks many kinds of small fruits, including strawberries and apples. It is also guilty of robbing the nests of wild birds of both eggs and nestlings. It does some damage to telegraph poles by boring into them to make nests. No doubt some of these charges are well founded. For the most part they represent the occasional acts of individuals, or are local and not characteristic of the species as a whole.

RED-SHAFTED FLICKER (Colaptes cafer collaris).

Length, 12 to 14 inches. To be distinguished from its eastern relative (*C. auratus*) by its red mustache and nuchal band and the red wing and tail shafts.

Range: Rocky mountain region from British Columbia south to Mexico, west to the coast mountains in Oregon and Washington, and through California; largely resident.

Few birds are more widely known than the flicker, as appears from the fact, recorded by Chapman, that in the various parts of the country it appears under no fewer than 124 aliases. Though well known, the flicker is more often heard than seen, its loud call often proclaiming its presence when it is hidden among the trees. As a rule the flicker is shy and in some sections of the country it has good reason to be, since it is accounted a game bird and, as such, pursued for the table.

Though a woodpecker, the red-shaft departs widely from typical members of the tribe both in structure and habits. Notwithstanding the fact that its bill is not well adapted for boring into wood for larvæ, the bird manages to do considerable damage in the west by making holes, in church steeples, school houses and other buildings, to serve as roosting quarters. As it is nowise particular as to its domicile, it is possible materially to increase its numbers by putting up nesting boxes for its accomodation. The bird's subsistence is obtained largely from the ground, where it secures vast quantities of ants, for taking which its tongue is specially adapted; about one half its food in fact consists of these creatures. The flicker also consumes grasshoppers, crickets, and beetles, but it is so much of a vegetarian that the list of berries and seeds it eats is a long one, though it is not accused of taking domestic fruit.

CALIFORNIA WOODPECKER (Melanerpes formicivorus and races).

Length, about $9\frac{1}{2}$ inches. Easily distinguished from its fellows by its general black color, white forehead, throat patch, belly and wing patch.

Range: Breeds from northwestern Oregon, California, Arizona, and New Mexico south through Lower California to Costa Rica.

The California woodpecker is a noisy, frolicsome bird and by all odds the most interesting of our woodpeckers. Its range seems to be determined by that of the oaks upon which it lives and from which it draws a large part of its subsistence. In California the bird is known to many by the Spanish name, *carpintero*, or carpenter, and its shop is the oak, in the dead limbs of which, as in the bark of pines, it bores innumerable holes, each just large enough to receive an acorn. That the birds do not regard the filling of these storehouses as work, but on the contrary take great pleasure in it, is evident from their joyous outcries and from the manner they chase each other in their trips from tree to tree like boys at tag. In California many of the country school houses are unoccupied during the summer and the woodpeckers do serious damage by drilling holes in the window casings and elsewhere with a view to using them as storage places. As long as the acorn crop lasts, so long does the storing work go on. Meanwhile the jays and squirrels slip in and rob the woodpecker's larder. Though this woodpecker eats insects, including some harmful ones, they form less than a third of its entire fare.

KINGFISHER
RED-HEADED WOODPECKER

RED-SHAFTED FLICKER
CALIFORNIA WOODPECKER

BLACK AND WHITE WARBLER (Mniotilta varia).

Length, about 4¾ inches. Easily known by its streaked black and white plumage.

Range: Eastern North America. Breeds from central Mackenzie, southern Keewatin, northern Ontario, Newfoundland, Nova Scotia and New Brunswick to eastern Texas, Louisiana, central Alabama and northern Georgia, west to South Dakota; winters in Florida and from Colima and Nuevo Leon to Colombia, Ecuador and Venezuela.

A warbler in form and general make-up, a creeper by profession and practice, this readily identified species, in its striped suit of black and white, may be observed in any bit of eastern woodland. Here it flits from tree to tree or climbs over the trunks and branches, scanning every crack and cranny for the insects that constitute its chief food. Though not a lover of open country, it frequently visits the orchard, where it performs its part in the task of keeping insect life within due bounds. It nests on the ground and hides its domicile so skillfully that it is not often found. None of the warblers are noted as songsters, but the black and white creeper, as I like best to call it, emits a series of thin wiry notes which we may call a song by courtesy only. In scrambling over the trunks of trees it finds and devours many long-horned beetles, the parents of the destructive root-borers; it also finds weevils, ants and spiders.

YELLOW WARBLER (Dendroica æstiva and races).

Length, little more than 5 inches. Mostly yellow, breast and belly streaked with reddish brown.

Range: North America, breeding generally throughout its range south to California, New Mexico, Missouri and northern South Carolina; winters in Central and South America.

The "yellow bird," or wild canary, as it is sometimes called, is one of the commonest of the warbler tribe, and ranges over a vast extent of territory, being found here and there from ocean to ocean. Unlike some of its relatives, it prefers open thickets, especially of willows, to thick woodland, and often builds its pretty nest by the roadside or in garden shrubbery. Though not an expert musician, the yellow warbler sings early and often, and in zeal makes up what it lacks in quality of voice. Because its nest is easily found by the initiated, this warbler is often victimized by the infamous cowbird and is forced to bring up one, or even two, young cowbirds in place of its own rightful progeny. It is pleasant to be able to record the fact that sometimes the clever warbler knows enough,—how it knows it is another matter,—to evade the unwelcome responsibilities thus thrust upon it, and builds a platform over the alien egg and then continues its domestic affairs as originally planned. Indeed cases are on record when two cowbirds' eggs have been found in a nest, each covered up by a separate layer of nest material. If this is not intelligence of a high order, how else can we characterize it? The food of this warbler consists almost exclusively of harmful insects, including the black olive scale.

(See Biol. Surv. Bul. 17, p. 20 et seq.; also Bul. 29.)

AUDUBON'S WARBLER (Dendroica auduboni).

Length, about 5 inches. Much like the yellow-rump but with yellow crown and throat patch.

Range: Breeds from central British Columbia, Alberta and southwestern Saskatchewan to our southern border, east to South Dakota and Nebraska; winters from California and Texas, south to Guatemala.

America is particularly favored by the presence of the beautiful wood warbler family, the members of which are excelled by few birds in symmetry of form, pleasing coloration and graceful motions. They are also of highly beneficial habits. No member of the wood warbler family is more characteristic of the group than this beautiful bird. In voice, coloration, and habits it is almost the counterpart of the yellow-rump of the eastern states, for which indeed it might easily be mistaken were it not for its yellow throat, the corresponding area in the yellow-rump being white. It summers in the mountains and shows off to advantage against the dark foliage of the pines. It seems to have little fear of man and in winter frequents orchards, gardens, and dooryards. Wherever it may be it keeps up an incessant hunt for its insect food, in the pursuit of which, like many others of its family, it sometimes essays the role of flycatcher, being very expert and nimble on the wing. This warbler also devours large numbers of ants, flies, scale and plant lice, and various noxious beetles and bugs.

(See Biol. Surv. Bul. 30, pp. 43-46).

REDSTART (Setophaga ruticilla).

Length, nearly 5½ inches. To be distinguished from other warblers by its coloration and its motions. (See below.)

Range: Breeds from central British Columbia and eastern Canada to Washington, Utah, Colorado, Oklahoma and North Carolina; winters in the West Indies and from Mexico to Ecuador.

Its beauty of form and plumage and its graceful motions place this dainty bird at the head of our list of wood warblers—a place of distinction indeed. The bird appears to be the incarnation of animated motion and fairly dances its way through the forest. Spanish imagination has coined a suggestive and fitting name for the redstart, *candelita*, the little "torch bearer." The full appropriateness of the name appears as the graceful creature flits through the greenery, displaying the salmon-colored body and the bright wing and tail patches. The redstart is not unknown in some parts of the west, but it is essentially a bird of the eastern states, where it is a common inhabitant of open woodland districts. The wood warblers are not our most artful architects, and in this respect the redstart does not depart from the traditions of its kind. While it builds a rather neat and compact structure of strips of bark, plant fibres and the like, placing it in a sapling not far from the ground, the nest is not the thing of beauty one might be led to expect from such a fairy-like creature. Ornamental as the redstart is, it possesses other claims on our gratitude, for it is a most active and untiring hunter of insects, such as spittle insects, tree-hoppers and leaf-hoppers, and both orchard and forest trees are benefited by the unceasing warfare it wages.

(See Biol. Surv. Bull. 17, p. 20 et seq.)

Black and White Warbler
Yellow Warbler

Audubon's Warbler
American Redstart
Female, upper; male, lower

INDIGO BUNTING (Passerina cyanea).

Length, about 5½ inches. The male is easily identified by the rich blue color, with black wings and tail. The female is warm brown.

Range: Breeds from eastern North Dakota, central Minnesota, northwestern Michigan, southern Ontario and southern New Brunswick to central Texas, southern Louisiana, central Alabama and central Georgia; winters from southern Mexico to Panama.

The indigo bird is the brightest colored sparrow that visits the north, but one can hardly believe that the sprightly dandy, clad in his rich blue suit, is the mate of the inconspicuous brown bird that seeks assiduously to conceal herself in the leafy cover, as though a bit ashamed of the contrast between her working suit and the holiday garb of her spouse. The indigo is a frequenter of sprout land, of brushy thickets and of open woodland, and the male is fond of singing his cheerful lay from the topmost twig of a tall shrub or tree, as though challenging the world to produce his equal. For such a dainty bird, the nest is a singularly inartistic structure and very carelessly built. It is placed in the crotch of some low leafy bush and is not at all difficult to find.

The fine feathers of the male are not the only claim of the indigo bird to our interest. Its food consists largely of weed seed, but it eats many insects, including a goodly proportion of grasshoppers and caterpillars.

WHITE-THROATED SPARROW (Zonotrichia albicollis).

Length, about 6¾ inches. The white throat and yellow before the eye are its distinguishing colors.

Range: Over most of eastern North America. Breeds in much of Canada south to southern Montana, central Minnesota, central Wisconsin and in the mountains of northern Pennsylvania, New York and Massachusetts; winters south of the Ohio.

This is one of the bird lovers' favorites, as well it may be. Its beautifully variegated plumage, its jaunty ways, its familiarity and its sweet and plaintive whistle all combine to commend the bird to our interest. In the fall it comes to us in large flocks associated with other species, especially juncos and various other sparrows. The "peabody bird" is singularly prodigal of its sweet song, and the young white-throats begin to try their voices in the fall as if practicing for the more exacting demands of spring. When a number join in the fall chorus the result is singularly sweet and inspiring. Many a camper in the north woods, as he lies in his blanket under the stars, pays tribute to the sweet voices of this songster, as it is borne on the midnight air to his ears from some leafy retreat.

The food habits of this sparrow give it a place among the farmers' friends. It is a great destroyer of weed seed and is especially fond of those of ragweed and bindweed. In the cotton belt, where many white-throats winter, it includes among its insect food the boll weevil.

LAZULI BUNTING (Passerina amœna).

Length, from 5¼ to 5½ inches. Male blue above, breast brownish; wing bars white. Female brownish.

Range: Breeds from southern British Columbia, southern Alberta, southeastern Saskatchewan and western North Dakota to southern California and southwestern Texas; winters in Mexico.

The lazuli finch is a near relative of the indigo bunting and the nonpareil, and its habits are in a general way very similar. There is the same disparity between the dress of the sexes, the color of the female being comparatively dull and homely. The male, however, is a gay plumaged dandy in his suit of turquoise blue, and is likely to surprise the stranger who meets him for the first time, since his colors suggest a tropical setting and are somewhat out of keeping with his surroundings. Notwithstanding his fine feathers, he is not so fond of displaying himself as is his cousin, the indigo bird, but seems to think that the cover of brush and chapparral is essential to his safety. The lazuli finch is a cheerful singer, and its song may be heard at frequent intervals. This song is vivacious and pleasing and the Easterner who hears it for the first time will have no difficulty in guessing at the identity of the chorister, from the resemblance of his lay to the ditty of the indigo bird.

We know comparatively little about the food habits of this finch. It is known, however, that it is a confirmed seed eater and also devours many insects.

SLATE-COLORED JUNCO (Junco hyemalis).

Length, about 6¼ inches. Prevailing color grayish slate, belly white; outer tail feathers tipped with white.

Range: Breeds in much of Alaska and Canada and in the mountains of New York, Pennsylvania and Massachusetts, while a nearly related form (the Carolina Junco) breeds in the southern Alleghenies; winters throughout the eastern states to the Gulf.

Only one junco inhabits the eastern United States, but several species live in the west. All of the members of the group resemble each other in a general way and all have similar habits. Most of us know the junco only in the fall and when, after having summered in the mountains of the more northern districts, the birds gather in large flocks and forsake high altitudes for more congenial surroundings. The junco associates with other sparrows, usually far outnumbering them, but its slate-colored plumage and white tail feathers reveal its presence unmistakably. Its familiar "tsip," may be easily recognized among the medley of notes, but its low sweet song is to be heard at its best only in its alpine home. Nevertheless, as the late migrants shape their course for the northern woods, it is not uncommon to hear the males of a flock burst into song, as if they really could not be content to remain silent any longer. When snow is on the ground the juncos are often hard pushed for food and on such occasions a flock will readily respond to an invitation to visit the dooryard and dine on table crumbs or small seeds of any kind.

The junco is one of our most persistent grass and weed seed eaters and in winter and spring seeds constitute much the greater part of its fare. Taking the year around about one-fourth of its food consists of insects, including leaf beetles, weevils, caterpillars, grasshoppers and many others.

(See Biol. Surv. Bul. 15, pp. 80-82.)

INDIGO BUNTING
Male, upper; female, lower
WHITE-THROATED SPARROW

LAZULI BUNTING
Male, upper; female, lower
SLATE-COLORED JUNCO

BLACK FLYCATCHER; PHAINOPEPLA (Phainopepla nitens).

Length, about 7½ inches. The glossy black color and marked crest of the male and the brownish gray of the female, also crested, distinguish this species.

Range: Breeds from central California, Nevada, Utah, and southwestern Texas southward; winters from southern California southward.

Though a distant relative of the cedar bird, the phainopepla differs markedly from that species both in appearance and habits. It is known to few, for it lives chiefly in the desert country of the southwest, though it is not wholly a stranger in the parks and gardens of that region. When flying the white wing-patch becomes conspicuous and distinguishes the bird from all others. In the fall it is not unusual to find it in loose flocks the members of which are drawn temporarily together, perhaps by the abundance of some favorite food. Like the cedar bird, it is essentially a berry eater, and in California sometimes makes free of the cherry crop. Its chief dependence, however, is the mistletoe, the mucilaginous berries of which delight it, as also do those of the juniper and pepper. Its partiality for mistletoe is probably the bird's worst trait, as it distributes the seeds of this pernicious parasite to the detriment of many fine oaks and sycamores. It eats many insects, principally ants, and has the habit of perching on a tall shrub, from which it sallies forth after flying insects, thus simulating a flycatcher. It is this habit which has given the bird its common name. The phainopepla has a variety of call notes and a very pleasant song.

RED-EYED VIREO (Vireosylva olivacea).

Length, about 6¼ inches. The slaty gray crown enclosed by narrow black lines serves to identify this vireo.

Range: Breeds from central Canada south to southeastern Washington, southern Montana, eastern Wyoming, eastern Colorado, western Texas, and central Florida; winters in South America.

The red-eye is one of the commonest not only of our vireos but also of all our small birds, and inhabits every suitable piece of woodland throughout its territory. Its notes may be frequently heard coming from the village shade trees; city parks and streets also know it. Its most notable trait is its habit of singing almost continuously as it moves slowly through the branches, pausing now and then to pick up a caterpillar or other insect. In woods where these vireos are common its voice may be heard all the livelong day, even during the noon hours when most birds are silently resting. The nest, suspended in a V-shaped fork, is a beautiful specimen of avian architecture, and so indifferent is the bird to its location that the nest of no other bird is so frequently seen by the chance passerby.

Though fond of mulberries and sassafras berries, the red-eye eats insects by preference, and spends most of its time gleaning the branches for plant lice scales and caterpillars of various kinds. It eats such harmful beetles as the long-horned borers and weevils. I once saw a red-eye with a full grown luna moth in its bill. After vigorously beating the helpless moth on a limb to get rid of the wings the bird succeeded in reducing the enormous body to a formless mass and eventually swallowed it.

(See Bull. 17, p. 23.)

YELLOW-THROATED VIREO (Lanivireo flavifrons).

Length, about 6 inches. Its green upper parts and bright yellow throat and upper breast are its identification marks.

Range: Breeds from southern Canada south to central Texas, central Louisiana and central Florida; winters from southern Mexico through Central America.

By no means so common as the red-eye, the yellow-throat inhabits the same kind of woodland tracts and like it may often be seen, and still oftener heard, in the trees that shade the village or even the city streets. It is, however, much less common in such places since the advent of the English sparrow, having been driven away by that little pest. Its song is much like that of the red-eye, yet it has a rich throaty quality quite foreign to the notes of that tireless songster and far superior to them. Neither this, nor indeed any of the vireos, ever seem to be in a hurry. They move quietly through the leafy covert, scanning the most likely lurking places for insects, pausing now and then to sing in a meditative manner, then renewing their quest. All of which is as different as possible from the busy, nervous movements of the wood warblers, that seem ever in haste as though time were much too precious to waste.

The food of the yellow-throat consists of a large variety of insects, including caterpillars, moths and beetles, and also those well-known pests, flies and mosquitoes. It also eats the plum curculio.

LARK SPARROW (Chondestes grammacus and sub-species).

Length, about 6¼ inches. The variegated head markings and white outer tail feathers distinguish this species.

Range: From western Pennsylvania and western Maryland and the Mississippi valley westward; and from southern British Columbia and southern Saskatchewan to central Alabama, northern Louisiana, Texas and south into Mexico; winters from northern California, southern Texas and southern Mississippi to Guatemala.

With some of the habits of the grass finch and, like that species, having the tail feathers tipped with white, the lark sparrow yet possesses distinctive traits of its own and after a little scrutiny can be mistaken for no other species. Its peculiar head markings have suggested the local western name of "snake bird," although the reason is not quite obvious. The lark finch is usually very abundant where found at all, and inhabits the open country, prairie, plain, and desert. It is often to be seen running along the dusty roads or perching on the roadside bushes and fences. It is a really fine songster and the possession of a musical voice has led to its capture and sale as a cage bird.

It has peculiar claims on the interest of the western farmer since it is to be classed in the front rank of sparrows as a destroyer of grasshoppers. These harmful insects and others constitute about a third of its food for the year, while weed seeds of great variety form the other two thirds.

Black Flycatcher or Phainopepla
Female, upper; male, lower
Yellow-throated Vireo

Red-eyed Vireo
Lark Sparrow

MARYLAND YELLOW-THROAT (Geothlypis trichas and variety).

Length, about $5\frac{1}{2}$ inches. Mostly green above, yellow below. Distinguished from other warblers by broad black band across forehead, bordered narrowly with white.

Range: Breeds from southern Canada to southern California, Texas and Florida; winters from the southern United States to Costa Rica.

This little warbler is common throughout the eastern and southern states, frequenting thickets and low bushes on swampy ground. He is not a tree lover, but spends most of his time on or very near the ground, where he hunts assiduously for caterpillars, beetles and various other small insects. Among the pests that he devours are the western cucumber beetle and the black olive scale. He has a cheery song of which he is not a bit ashamed and, when one happens to be near the particular thicket a pair of yellow-throats have chosen for their own, one has not long to wait for vocal proof that the male, at least, is at home. The yellow-throat has the bump of curiosity well developed and if you desire a close acquaintance with a pair you have only to "squeak" a few times, when you will have the pleasure of seeing at least one of the couple venture out from the retreat far enough to make sure of the character of the visitor.

YELLOW-BREASTED CHAT (Icteria virens and sub-species).

Length, about $7\frac{1}{2}$ inches. Its size, olive-green upper parts and bright yellow throat, breast, and upper belly distinguish this bird at a glance.

Range: Breeds from British Columbia, Montana, Wisconsin, Ontario and southern New England south to the Gulf States and Mexico; winters from Mexico to Costa Rica.

The chat is one of our largest and most notable warblers. It is a frequenter of brushy thickets and swampy new growth and, while not averse to showing itself, relies more upon its voice to announce its presence than upon its green and yellow plumage. Not infrequently the chat sings during the night. The song, for song we must call it, is an odd jumble of chucks and whistles which is likely to bring to mind the quip current in the West, "don't shoot the musician; he is doing his best;" in this same charitable spirit we must accept the song of the chat at the bird's own valuation, which, we may be sure, is not low. Its nest is a rather bulky structure of grasses, leaves and strips of bark and is often so conspicuously placed in a low bush as to cause one to wonder how it ever escapes the notice of marauders fond of birds' eggs and nestlings.

The chat does no harm to agricultural interests but on the contrary, like most of the warbler family, lives largely on insects, and among them are many weevils, including the alfalfa weevil, and the boll weevil so destructive to cotton.

(See Biol. Surv. Bul. 17, p. 18 et seq.; also Circular 64, p. 5.)

OVEN-BIRD (Seiurus aurocapillus).

Length, a little over 6 inches. Above mostly olive green; below white, breast and sides streaked with black.

Range: Breeds from southern Mackenzie, Ontario, southern Labrador and Newfoundland south to Wyoming, Kansas, southern Missouri, Ohio Valley and Virginia; also in mountains of Georgia and South Carolina; winters in southern Florida, southern Louisiana, Bahamas, West Indies, and southern Mexico to Colombia.

The oven-bird is one of our best known birds and one the woodland stroller is sure to get acquainted with, whether he will or no, so common is it and so generally distributed. In moments of ecstacy it has a flight song which has been highly extolled, but this is only for the initiated, its insistent repetition of "teacher, teacher, teacher," as Burroughs happily phases it, is all the bird vouchsafes for the ears of ordinary mortals. Its curious domed-over grass nest is placed on the ground and is not hard to find. The food of the oven-bird does not differ greatly from that of other warblers, notwithstanding the fact that the bird is strictly terrestrial in habits. It consists almost exclusively of insects, including ants, beetles, moths, span worms and other caterpillars, with a few spiders, millepods and weevils.

(See Biol. Surv. Bul. 17; also yearbook for 1900, p. 416.)

CEDAR WAXWING (Bombycilla cedrorum).

Length, about $7\frac{1}{4}$ inches. Known from every other American bird, except its larger cousin, the Bohemian waxwing, by its crest, grayish brown upper parts, yellow tail band and sealing wax-like tips to secondaries and, sometimes, to tail feathers.

Range: Breeds from central British Columbia, Alberta, southern Keewatin, northern Ontario and northwestern Quebec south to southern Oregon, northern New Mexico, Kansas, northern Arkansas, and North Carolina; winters over most of United States and southward to Mexico and Panama.

In clothing the cedar bird, Mother Nature essayed her very best and reached the limit of quiet elegance. As if aware of the distinction conferred by its smooth delicately tinted plumage, the waxwing has the air of a well-bred aristocrat, and comports itself with a dignity that is very impressive. Why this beautiful creature should be denied a voice is a mystery but, with the exception of the faintest kind of a whistle and a few low notes, seldom heard, the bird is silent. But its beauty and the good it does should insure it careful protection.

Except during the nesting season, which is very late, the bird is a wanderer, moving about the country in flocks and remaining a shorter or longer time in a given locality according to the abundance of food. The waxwing is a berry eater and its local name of "cherry bird" indicates that it by no means disdains cultivated varieties. Fortunately the bulk of the fruit it takes consists of wild species, especially in winter, when cedar berries are greedily devoured. In the west it includes in its bill of fare mulberries and pepper berries. While insects constitute only a comparatively small percentage of its diet, those eaten include some very destructive species such as scales and the dreaded elm beetle.

(See Farmers' Bul. 54 (rev.), pp. 38-39.)

Maryland Yellow-throat
Female, upper; male, lower
Yellow-breasted Chat

Oven-bird
Cedar Waxwing

TOWHEE (Pipilo erythrophthalmus).

Length, about 8¼ inches. Male mostly black, belly white. Female brown. Outer tail feathers white tipped.

Range: Breeds in the United States from Saskatchewan and southeastern Canada south to Central Kansas and northern Georgia; winters from southeastern Nebraska and the Ohio and Potomac southward.

The towhee is a frequenter of second-growth and of scrub, and when the visitor enters such precincts he is pretty sure to hear the challenging cry, "chewink," and to catch sight of the bird as it hurriedly dashes into some brushy thicket as if in mortal terror. The flight is hurried, jerky and heavy, as though the bird was accustomed to use its wings only in emergencies. This is not far from being the case, as the towhee sticks close to mother earth and uses its great strength and long claws to advantage in making the leaves and rubbish fly in its vigorous efforts to uncover the seeds and insects upon which it relies for food. The towhee thus literally scratches for a living as no other of our birds does, except possibly the brown thrush, and the lazy man may well pass by the industrious ant and go to the towhee for inspiration. No one waxes enthusiastic over its musical ability, but the song is given with such right good will that it is sure to satisfy the hearer as, no doubt, it does the bird himself. Seton interprets it to a nicety with the phrase "chuck-burr, pill-a-will-a-will-a." The towhee includes in its bill of fare beetles and their larvæ, ants, moths, caterpillars, grasshoppers and flies, and also in Texas the boll weevil. Wild fruit and berries complete the list.

ORCHARD ORIOLE (Icterus spurius).

Length, about 7¼ inches. Our only oriole with black and chestnut markings. Female grayish olive green.

Range: Confined to eastern North America. Breeds from North Dakota, Minnesota, Wisconsin, Michigan, southern Ontario, central New York and Massachusetts south to northern Florida, the Gulf Coast and southern Mexico, west to central Nebraska and western Kansas; winters from southern Mexico to northern Colombia.

Though clad in modest garb (for an oriole) and in no respect a rival of the Baltimore, the orchard oriole has merits of his own. As his name implies, he is a lover of orchards, and I have always associated him with the glory of apple orchards in full bloom and with the delicious perfume with which the air is heavy. Amidst such surroundings, the black and chestnut livery of the orchard oriole marks him as one of the princes of our bird world. Gardens and parks also know him well, and he is not averse to swinging his nest from the trees that shade the farmer's house. His nest betrays his connection with the family of weavers, but his skill does not equal that of the Baltimore and he is content with a smaller pensile basket made chiefly of grasses. His song, like his dress, is modest, but it is exceedingly sweet, and one who hears it is sure to pause in his walk and wish that it were longer and given more frequently.

The orchard oriole is chiefly insectivorous, as indeed are all of our species.

CALIFORNIA BROWN TOWHEE (Pipilo crissalis and varieties).

Length, about 9 inches. The long tail and brown plumage with white belly distinguish these ground- and thicket-loving birds.

Range: Southwestern Oregon, through California to northern Lower California.

The brown towhees, of which the California form is a good type, are characteristic of the brushy canyons of the far west, where they skulk and hide among the shrubbery and cactus much as do the common eastern towhees. Their powers of wing are not great and their long tails and heavy bodies render their flight awkward in the extreme. On the ground, however, they run with great ease and speed. In California brown towhees are common in the parks and gardens, and in every way are very much more familiar than the related towhee of the east. Like its eastern cousin, it is much addicted to scratching among leaves and rubbish, for which work its stout legs and claws are particularly adapted. The thin "tchip," which is the call note, seems out of all proportion coming from such a stout, vigorous body. The birds of this group are not fine songsters, but their simple ditties are pleasant to hear in the waste places where they are generally found.

The brown towhee is much more of a vegetarian than an insect eater, and in California Professor Beal found that 85 per cent. of its yearly food consists of fruit, grain and weed seeds.

BALTIMORE ORIOLE (Icterus galbula).

Length, about 7½ inches. The combination of black and orange marks this bird from its fellows.

Range: Breeds from central Saskatchewan and the southeastern provinces of Canada south to northern Texas, Louisiana and northern Georgia, west to Montana, Wyoming and eastern Colorado; winters from southern Mexico to Colombia.

Lord Baltimore was signally honored when one of our finest birds was christened with his name because it chanced to carry the family colors, black and yellow. Orioles are a tropical group and the luxuriant tropical forests are bright with the gleaming colors of many species of these beautiful birds. Only a few have found their way into the temperate zone, but not one of the tropical species is garbed in more tasteful dress than this exotic which has adopted the elms and sycamores of the temperate zone for its summer home. When chill November winds have stripped our shade trees of their foliage then are revealed the long, pendant nests, wrought with so much skill and patience by Madame Oriole, and we begin to realize how many of these birds summer with us. Suitable material for the oriole nest is none too easily found, and the weaver is not so fastidious that she will not accept strings and yarn of any color which are hung out for her convenience; so that at the end of the oriole season the bird lover who is willing to co-operate with a pair of Nature's weavers may fall heir to a nest made to order, so to speak.

The oriole is as useful as it is tuneful and ornamental. Caterpillars constitute the largest item of its fare, including many not touched by other birds. It eats also beetles, bugs, ants, grasshoppers and spiders. Particular mention must be made of the boll weevil, of which the oriole is a determined foe. The small amount of fruit taken by the oriole, including cherries, is insignificant when compared with the long list of harmful insects it destroys.

Towhee or Chewink
Male, upper; female, lower
Orchard Oriole
Male, upper; female, lower

California Brown Towhee
Baltimore Oriole
Male, upper; female, lower

MAGPIE (Pica pica hudsonia).

Length, from about 18 to 21 inches. The black head and body and the white belly, white wing patches, and long tail are distinguishing features. The yellow-billed magpie is smaller with a yellow bill.

Range: A characteristic western species. Breeds from Aleutian Islands and Alaska, central Alberta, southern Saskatchewan and Winnipeg Lake south to northern Arizona and New Mexico, and from the Cascades and Sierra to western North Dakota and western Texas; resident.

There are two species of magpies, the yellow-billed being confined to California, where it is very local. In general the habits of the two are similar. "Maggie," as this bird is familiarly known in the west, possesses dual traits. He is beautiful of plumage and adds much to the interest of the landscape as he flies from field to field, his long tail extending behind like a rudder.

Of eminently sociable disposition, this bird is rarely seen alone. He prefers flocks of family size to 50 and upwards. In more ways than one the magpie is like the crow and his sagacity has developed along much the same lines. In most localities he is suspicious and wary, as he has good cause to be, for he is not a favorite with either farmer or ranchman. He is eminently carnivorous, a carrion feeder by preference, an insect eater by necessity, and he performs good service in the latter role. He eats also many wild fruits and berries, but he is an incorrigible thief and well he knows his way to the poultry yard. No sound is sweeter in "Maggie's" ears than the cackle of the exultant hen that has just laid an egg, and the hen house must be well protected that keeps him from his plunder. Perhaps his worst trait, however, is his fondness for the eggs and nestlings of small birds.

PHŒBE (Sayornis phœbe).

Length, about 7 inches. Distinguishing marks are the dusky brown color, dark brown cap and white margined outer tail feathers.

Range: Lives mainly in the east. Breeds from about middle Canada south to northeastern New Mexico, central Texas, northern Mississippi and mountains of Georgia; winters from south of latitude 37° to southern Mexico.

Few of our birds have won a more secure place in our hearts than plain little phœbe, who has no pretentious to beauty of plumage or excellence of song. For this its confiding disposition and trusting ways are responsible, and many a farmer listens for its familiar voice in early spring and welcomes it back to its accustomed haunts under the old barn. Originally building its nest on the face of cliffs, the phœbe soon forsook the wilds for man's neighborhood, and year after year apparently the same pair returns to the identical rafter in the barn, the shelter of the porch, or the same nook under the foot bridge, which they have claimed for their own for many seasons. The insistent call of "phœbe—phœbe" is as familiar as the pipe of the robin.

The phœbe has further claims to the favor of man since it is one of the most useful of birds, living almost wholly on insects, among which are many noxious kinds, as May beetles, click beetles, and several species of weevils, including the boll weevil and the strawberry weevil. As if reluctant to leave their northern home, many phœbes remain with us till late fall, and individuals may be seen lingering in sheltered places in the woods long after other flycatchers have started for the tropics.

BLUE-FRONTED JAY (Cyanocitta stelleri and sub-species).

Length, 11¾ to 13 inches. Easily distinguished from its fellows by its high crest, brownish slaty fore-parts, dark blue wings and tail and blue or whitish streaks on forehead.

Range: Resident in western North America from southern Alaska and Montana to Mexico.

The blue-fronted jays, of which the Steller jay may be taken as the type, are common inhabitants of the piny woods of both the Rocky Mountain and the Sierra Nevada States. They are among the handsomest of the family, the beauty of their plumage, their long erectile crests, and their insistent voices compelling the attention of any who invade their retreats. Not being residents of cultivated districts, although they eat grain and small fruits, they do comparatively little damage. On the other hand, they do not do much good, for, although they are insect eaters, insects do not constitute a large part of their food, nor are the kinds they eat very important economically. Probably their most serious fault is a fondness for the eggs and young of small insectivorous birds of which they destroy many in the course of the year. They share this failing with all other members of the family, and bird lovers must deem it a pity that such bold, dashing, handsome birds as the jays should be so destructive to small but useful birds. This habit is all the more to be deplored inasmuch as when unmolested jays readily respond to invitations to be neighborly, and willingly take up their abode near houses, where they never fail to excite admiration and interest.

WOOD PEWEE (Myiochanes virens).

Length, about 6½ inches. Not readily distinguished by color, though darker than most other small flycatchers, and with wing longer than tail.

Range: Breeds from Manitoba and southeastern Canada to southern Texas and central Florida; winters in Central and South America.

The wood pewee is clad in such modest garb and is of such retiring disposition that, were it not for its voice, it would often be passed unnoticed even by the most observant, especially as its home is in shaded glens or deep woods. Here the wood pewee pursues its vocation with a vigor worthy of all praise, and the snap of its mandibles as they close over some luckless flying insect is often the only sound heard in the depths of the quiet forest. There is little about the habits and make-up of this, or indeed of any of the flycatchers, to suggest great constructive skill, but the nest of the wood pewee is a marvel of taste and ingenuity and, though much larger, suggests the dainty architecture of our hummingbirds. Like their fairy creations the wood pewees' nest is covered with lichens and saddled neatly across a limb.

The food of this flycatcher consists almost exclusively of insects and includes among others crane flies, beetles, dragon flies, ants, grasshoppers, caterpillars and moths of many kinds. It also devours such pests as the clover weevil, the plum curculio, the corn weevil, the rice weevil, and others nearly as harmful, and many flies, including the house fly.

Black-billed Magpie
Yellow-billed Magpie
Phœbe

Blue-fronted Jay
Wood Pewee

RUBY-THROAT (Archilochus colubris).

Length, about $3\frac{3}{4}$ inches. Needs no description as it is the only hummer living in the eastern states.

Range: Breeds from southeastern Saskatchewan and central Quebec south to Gulf Coast, west to North Dakota, Nebraska, Kansas and central Texas; winters from middle Florida and Louisiana through southern Mexico and Central America to Panama.

Of the five hundred or more species of this strictly American family, the eastern United States is favored by the presence of only one, the ruby-throat, nor is this species as common as might be desired. Compared to the abundance of its kind in the far west it is rare indeed. As if afraid of being too prodigal of her gifts, Nature has denied the hummingbird song, and the harsh squeaks of these tiny sprites are far better adapted to making war than love. Truth is, the hummer has a sharp temper and not only engages in warfare with its own kind but attacks any bird, however large, that ventures to dispute its territorial rights. These are not small, for in its own estimation it is literally "Lord of all it surveys." The male is an inconstant swain and no sooner is the nest made—and in the making he takes no part—and the eggs laid than he departs, leaving the joys and cares of housekeeping to his erstwhile mate. While the nectar of flowers is eaten in large quantities, a creature so vivacious as the hummer could hardly sustain life on diet so thin, and the bird adds to its bill of fare a liberal supply of minute insects and spiders of various sorts.

WHIP-POOR-WILL (Antrostomus vociferus).

Length, about 10 inches. Not to be confused with the nighthawk, which flies by day and has white wing bars, while the whip-poor-will is crepuscular and nocturnal.

Range: Breeds from the Atlantic to the plains, and from Manitoba and the eastern Canadian Provinces south to northern parts of Louisiana, Mississippi and Georgia; winters from South Carolina and the Gulf States to Central America.

This bird of the night, whose day begins with the going down of the sun when the nighthawk's ends, is common throughout the east in open woodlands, on the edges of which it likes to hunt. It dozes away the hours of daylight squatting on the ground among the leaves where its marvelous protective coloration affords it safety. No sooner have the shadows lengthened, however, than it becomes active and its characteristic note resounds through the forest glades. So plaintive is its cry and so mysterious its comings and goings, that in the minds of many its notes are associated with misfortune, as a death in the house near which it persistently calls. Its two eggs are laid among the leaves, needing no other protection than the cover of the mother's body. The whip-poor-will may be accounted one of our most efficient insect destroyers, as its immensely capacious mouth beset with bristles, a regular insect trap, would suggest. Among its prey it includes May beetles and moths. These two form the principal articles of food and as they are parents respectively of the white grub worm and an innumerable host of caterpillars their destruction is of marked benefit to agriculture.

RUFOUS HUMMINGBIRD (Selasphorus rufus).

Length, from $3\frac{1}{4}$ to $3\frac{3}{4}$ inches. The reddish brown body color, red and green gorget, and the notch in tail feathers serve to distinguish this species from our other hummers.

Range: Breeds from the Alaskan coast, east central British Columbia, and southern Alberta south to the mountains of central California, and southern Idaho.

One can but wonder at the hardihood of this little wanderer from the tropics in including in its summer itinerary a journey to distant Alaska. It reaches a latitude of 61°, much farther north than any other of its kind. In favored glades of the forests in the Rocky Mountains and the Sierras during the migration this and other species of hummers are to be seen literally by hundreds. The rufous hummer has temper and courage to match its fiery hues, and spends no small part of its time doing battle with its fellows. The contestants after several fierce rounds fly away not only fit but eager for another fray on the first occasion. In addition to the nectar of flowers, its standard fare, this hummer includes in its diet "honey dew," the sugary secretion of plant lice which is deposited on vegetation. Like all other hummers it eats large numbers of minute insects which it finds inside the flowers. It is interesting to note that hummingbirds discover the flowers they frequent by sight alone and any bit of bright color in the distance is sure to attract their notice, as a bright red handkerchief on a bush or about the neck. More than once I have observed them poising within a few inches of my head evidently endeavoring to ascertain the nature of the red handkerchief I wore.

ROAD RUNNER (Geococcyx californianus).

Length, 20 to 24 inches, mostly tail. Quite unlike any other North American bird in form and color.

Range: From the upper Sacramento Valley south through California and the peninsula and from Colorado, Kansas, middle and western Texas, Arizona and New Mexico southward; resident.

The name "road runner" when applied to a cuckoo may seem an anomaly to those who know only our eastern cuckoos, but in truth the road runner is anomalous in many ways. It is distinguished by curiously marked plumage, the possession of a long bill and a disproportionally long tail. As a result of its strange appearance, and stranger antics, the road runner is made the hero of many a fable. Among other wonders it is claimed that it can outrun the swiftest horse and kill the biggest rattlesnake. It is said to accomplish the latter feat by surrounding the reptile while asleep with a rampart of cactus spines on which the enraged reptile accommodatingly impales itself.

The truth is that when in a hurry this ground cuckoo can run with great speed, though as yet no official record of its best time has been made. Its food consists of a great variety of harmful insects, among which the snout beetles or weevils are conspicuous. It devours also mice, horned lizards, centipedes, land shells and small snakes; probably a young rattlesnake would fare no better than any other small snake. Its notes are difficult to interpret with words, but are not likely to be forgotten when once heard, and they are frequently uttered in the early morning from the topmost bough of a mesquite or other tree.

Ruby-throated Hummingbird
Male, upper; female, lower
Whip-poor-will

Rufous Hummingbird
Male, upper; female, lower
Roadrunner

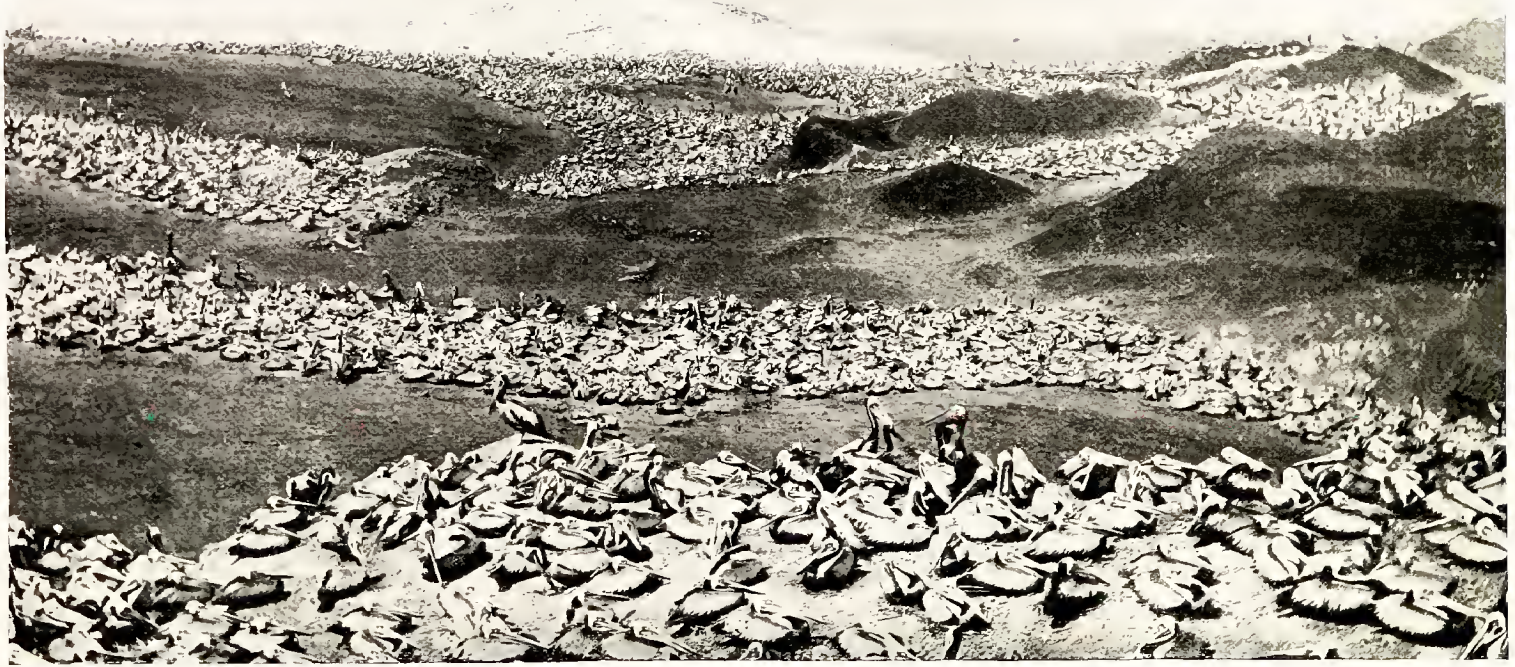


Photo by Robert E. Coker

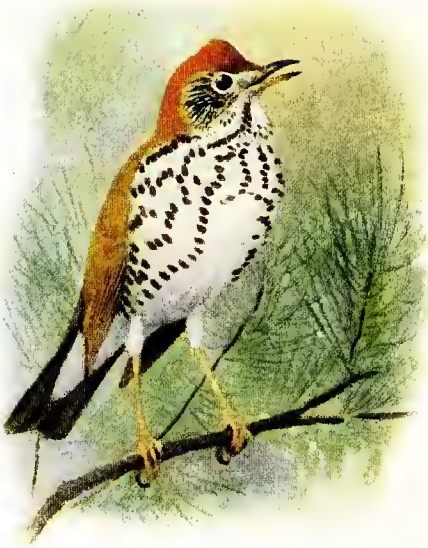
PELICANS ON THE LOBOS DE AFUEVA ISLANDS, PERU

It was estimated by Mr. Coker that there were upward of 100,000 pelicans, all told, on the eastward island of the Lobos de Afuevas. At the time of the writer's next visit there he saw scarcely any birds near the old rookery. It is one of the tragedies of the guano industry that this important bird has received so little consideration.

Photo by Robert E. Coker

ONE HUNDRED THOUSAND PELICANS

Such an array of big gray birds makes a more showy effect than a vastly greater number of smaller birds. Unfortunately, this great and valuable rookery, unmolested for several years, was not permitted to remain undisturbed.



Varied Thrush
Veery

Wood Thrush
Bush-tit

VARIED THRUSH (Ixoreus nævius).

Length, about 10 inches. Its large size and dark slate-colored upper parts, black breast collar, orange brown stripe over eye and orange brown under parts mark this thrush apart from all others.

Range: Breeds on the Pacific coast from Yakutat Bay, Alaska, south to Humboldt County, California; winters from southern Alaska to northern California.

This, one of our largest and finest thrushes, is limited to the west coast, where it finds a congenial summer home in the depths of the coniferous forests, the mystery and loneliness of which seem reflected in its nature. Although the varied thrush somewhat suggests our robin, it is much shyer, and its habits and notes are very different, making it more nearly akin to the small olive thrushes. It nests in the conifers, and its eggs, unlike those of the robin, are heavily blotched with brown. Its song, a single long-drawn note, has been greatly praised, and seems entirely in harmony with the bird's surroundings, being weird and inspiring. In winter the varied thrush abandons the forest and with it many of the habits of the recluse, and visits more open districts, including ravines and even gardens, where it becomes quite familiar.

This thrush, like its smaller brethren, feeds chiefly on the ground, and its food is largely of vegetable nature, but includes a fair proportion of insects, with millepeds and snails. Unless its habits are greatly modified by the encroachment of civilization on its domain it is not likely to be much of a factor in agricultural affairs, but it will continue to make itself useful by destroying the insect enemies of forest trees.

VEERY (Hylocichla fuscescens fuscescens).

Length, about 7½ inches. To be known from the other small thrushes by its uniform cinnamon brown upper parts and its faint brown breast markings.

Range: Breeds from northern Michigan, central Ontario and Newfoundland south to northern Illinois, northern Indiana, northern Ohio and New Jersey; and in the Alleghenies south to North Carolina and northern Georgia; winters in South America.

Far more retiring than either the wood thrush or the hermit, the veery must be sought in the seclusion of the swamp or swampy woodland, far from the recesses of which he rarely ventures. Much of his time he spends on the ground, for on or near it he finds his chosen fare. Though trim in form and clad in a garb of modest color as befits his nature, the veery appeals less to the bird lover's eye than to his ear. Though some of his relatives are classed among the most famous of American songsters, the veery may fairly claim place in the front rank, and his wild, mysterious and all-pervading notes touch certain chords in the human breast which respond to the song of no other of our birds.

The food of the veery does not differ essentially from that of the other small thrushes and includes a great variety of small wild fruits and insects. As it rarely visits the orchard or farm its insect-eating habits have little direct bearing on the farmer's interest, although indirectly the bird contributes its share to the beneficial work of staying the superabundant tide of insect life. It does, however, eat many weevils, and among them the notorious plum curculio.

WOOD THRUSH (Hylocichla mustelina).

Length, about 8¼ inches. To be distinguished among its fellows by its more bulky form, by the golden brown head, bright cinnamon upper parts, and the large round black spots beneath, sharply contrasting with the pure white.

Range: Breeds from southern South Dakota, central Minnesota, central Wisconsin, southern Ontario and southern New Hampshire south to eastern Texas, Louisiana and northern Florida; winters from southern Mexico to Central America.

The wood thrush finds its way to our hearts and sympathies more through its voice than its presence, and whoever has failed to hear its clear flute-like tones rising from the woodland depths as the mists of evening gather has missed a rich treat. It is no doubt true that the Hermit Thrush is a more finished performer, but that chorister reserves his music chiefly for the northern wilds while our wood thrush favors more southern lands. Moreover, the hermit is a true recluse and must be sought in the deeper forest, its chosen home, while its more southern cousin lives in comparatively open woodland and does not disdain to take up its summer residence in parks and gardens. The music of the one is for the favored few, while the song of the other is almost as well known as that of the brown thrasher.

Like most of the tribe, the wood thrush obtains its food chiefly from the ground, where it spends much of its time searching among the leaves. Insects with a small percentage of fruit, chiefly wild varieties, compose its fare. Among the insects are cutworms and other caterpillars, ants, grasshoppers and beetles, including the Colorado potato beetle. Thus the bird deserves a high place in our esteem for both esthetic and economic reasons.

BUSH-TIT (Psaltriparus minimus and sub-species).

Length, from 4 to 4½ inches.

Range: Pacific coast from southern British Columbia to the Cape Region of Lower California, and eastward to the interior of Oregon and California; nests generally throughout its range.

This pigmy among birds has many of the characteristic habits of the chickadee family, of which it is the smallest member. Extremely sociable, bush-tits move about in large flocks, occasionally in company with other birds, generally without. One moment you are alone, the next moment the trees and bushes are full of these diminutive little busybodies that scan you with their curious bead-like eyes as they hurry on in quest of food, keeping up the while a constant calling and twittering. Their pendant nests, often attached to oak trees, suggest the well-known structure of our hang-bird or Baltimore oriole, and are excellent specimens of bird architecture.

The few western states favored by the presence of this bird are to be congratulated, as more than half its animal food consists of insects and spiders, nearly all of which are harmful. Among the insects are many tree bugs, *Hemiptera*, which contain our most dreaded insect pests, such as the black olive scale and other scales equally destructive. The bush-tit is also a persistent foe of the codling moth in all its stages.

(See Farmers' Bul. 54, p. 44; also Bul. 30, pp.

House Finch
Female, upper; male, lower
Arkansas Goldfinch
Male, upper; female, lower

Purple Finch
Male, upper; female, lower
American Goldfinch
Male, upper; female, lower

HOUSE FINCH (Carpodacus mexicanus frontalis).

Length, about 6 inches. Grayish brown above, many feathers tinged with red. Below dull white, crown, rump, and throat crimson.

Range: Resident in Oregon, Idaho and southeastern Wyoming south to Lower California and Mexico.

The pretty little house finch of the far west is among the most domestic of American birds, and exhibits a predilection for the neighborhood of houses almost as strong as that of the English sparrow. It carols its sprightly lay from the tops of buildings in villages and even cities, and from the shrubbery of lawn and park. So confiding has the bird become that it places its nest in any crack or cranny of house or outbuilding that is large enough for its housekeeping operations. When such convenient and safe retreats are not to be had it builds a bulky nest in a tree or bush.

It is fond of fruit, including pears, cherries, and small fruit, which its strong conical bill enables it to break open with ease. Locally, therefore, it is a good deal of a pest and does much damage to fruit crops, especially where it is numerous. Much, however, can be said in mitigation of its offenses. The seeds of plants, a large proportion of those of noxious weeds, constitute seven-eighths of its food for the year. Plant lice which are notoriously harmful to many trees and plants, also are a favorite diet. So too are caterpillars and beetles; therefore, the balance is decidedly in the bird's favor.

This attractive songster was carried to the Hawaiian Islands years ago and now is numerous in Honolulu and also in the forest on the island of Hawaii where amid brighter and more tropical neighbors it seems curiously out of place, though it sings as often and as joyously as it ever did in its old haunts across the Pacific.

ARKANSAS GOLDFINCH (Astragalinus psaltria and sub-species).

Length, about 4½ inches. Upper parts olive green, more or less mixed with black in the sub-species; under parts yellow.

Range: Breeds from southern Oregon, Utah and northern Colorado to southern Lower California and into Mexico.

In the far west this goldfinch takes the place of the eastern goldfinch which in a general way it much resembles in habits. Like that bird it is rarely seen, save in the breeding season, except in small parties, the members of which seem to be on terms of the utmost familiarity and accord. The flight of this species, as of its kindred, is exceedingly characteristic. It disdains to cleave the air in straight lines but progresses in a series of graceful sinuous curves, which, however, take the little aeronaut rapidly from point to point. This flight is a sure mark of identification. The bird has a sweet warbling song and even its call notes are plaintive and pleasing. It abounds in orchards and gardens and is often to be seen by the roadside gleaning its food from the tall stems of thistle, sunflowers, groundsel and other seed-bearing plants and weeds, all of them either useless or positively harmful. It is by no means wholly a vegetarian, however, and eats many plant lice, sometimes filling the stomach with these minute creatures to the exclusion of all other food. As a weevil eater it is peerless, and it does no harm to any product of husbandry. Altogether this pretty little goldfinch deserves protection at the hands of man.

PURPLE FINCH (Carpodacus purpureus).

Length, about 6 to 6½ inches. Unlike any other eastern finch, the crimson head of the male sufficiently distinguishes it.

Range: Breeds in southern Canada and southward to North Dakota, Minnesota, Illinois, Pennsylvania mountains, and northern New Jersey; winters from somewhat north of the southern boundary of its breeding range to the Gulf States.

Considering that it is common and widely distributed, the purple finch is not so well known as it should be. For one thing it has a marked liking for the tops of trees, particularly elms, and when in a tree top and more or less screened by foliage it requires the aid of a good glass to make its identity sure. Its warbling song is sweet and melodious but is all too brief for perfect enjoyment, though in spring the bird is prodigal enough of its carols, and not infrequently a dozen males may be heard singing at once in the same or in contiguous trees. It frequently nests around houses and for a site is very partial to the Virginia Juniper.

The purple finch lives almost entirely on the seeds of various plants, including those of false buckwheat and ragweed, with some wild berries. It is accused, not without reason, of being a confirmed budder of fruit and other trees, but the damage it inflicts on eastern orchards appears to be very slight, if indeed the modest budding it does is an injury at all.

AMERICAN GOLDFINCH (Astragalinus tristis and sub-species).

Length, about 5 inches. Easily distinguished by its rich yellow plumage and black crown and tail.

Range: Breeds from southern Canada south to southern California, southern Colorado, Arkansas and northern Georgia.

The thistle bird is one of our best known finches, being not only common but very sociable. It usually goes in small flocks, or family parties, and sometimes the tall thistles on which it likes to feed bend with the united weight of several of the gay plumaged little goldfinches. It is a law unto itself as regards its nesting period, and begins to think seriously about housekeeping when other birds are feeding full grown youngsters, or are debating the propriety of a second brood. The goldfinch has a pretty and plaintive call note, and its full song is well worth listening to. It is much like that of the canary, so much alike, in fact, that the bird is often called the wild canary.

Throughout the year the goldfinch is a seed eater, especially of weed seeds, and it eats also many insects, including canker worms, plant lice, and beetles. Our goldfinch sometimes annoys the farmer by attacking the lettuce seeds which have been left to mature for next season's planting, but the damage in this way is slight, and Prof. Beal has been told that even on the large seed farms of California it is never serious enough to call for protective measures.

(See Biol. Surv. Bul. 17 and Bul. 34, pp. 71-73.)

Vesper Sparrow
Blue Grosbeak
Male, upper; female, lower

Cardinal
Male, upper; female, lower
California Quail

VESPER SPARROW (Pooecetes gramineus and sub-species).

Length, about 6 inches. Its white tipped outer tail feathers distinguish this individual from its brown liveried fellows.

Range: Breeds from southern Canada south to Oregon, Arizona, Texas, Kentucky, Virginia and North Carolina; winters from southern California, Texas, Missouri and North Carolina, south to the Gulf coast and southern Mexico.

There is little about this brown streaked sparrow to attract attention and, until it flies and displays the white tipped tail feathers, you might mistake the bird for any one of a half dozen of the sparrow family. Indeed if one catches merely a glimpse of a vesper sparrow crouched low and running swiftly through the grass one may be forgiven for mistaking the bird for a mouse. It frequents open pastures and when singing likes to mount a rocky boulder so common in New England and other parts of the east. We are perhaps justified in calling its song its most notable characteristic. Though not a pretentious effort the voice of the vesper sparrow is sweet and plaintive beyond expression, and harmonizes with the dying day as does the song of no other bird.

Prof. Beal records the fact that in winter the food of this sparrow consists wholly of vegetable matter, while in summer it consists of little else than insects. The vesper sparrow cares less for grass seed than any other of its fellows but consumes great quantities of weed seeds. It eats also large numbers of grasshoppers, caterpillars and weevils. A number of these sparrows taken in Utah where the newly imported alfalfa weevil is doing much damage were found to have eaten these weevils to the average extent of more than half their food. Thus the value of this bird to the farmer cannot be questioned.

BLUE GROSBEAK (Guiraca cærulea and subspecies).

Length, about 7 inches. Distinguished by its larger size from the indigo bird which alone resembles it.

Range: Breeds in the southern United States north to northern California, Colorado, Nebraska, southern Illinois and Maryland and south to southern Mexico; winters in Mexico and Central America.

One seldom sees the blue grosbeak at short range or under circumstances which make identification easy, as the bird is rather shy and frequents brushy thickets and viny tangles much as does the indigo bird. The low warbling song of this grosbeak may be compared with that of the purple finch but it is neither so loud nor so well sustained. Under the name of "blue pap" the grosbeak used to be a favorite cage bird in Louisiana and other southern states, and no doubt is so today, despite protective laws. In the matter of diet it shows a marked preference for insect food over vegetable, the proportion being about 67 to 33 per cent. The vegetable matter includes many weed seeds, as foxtail and bindweed, also corn, the taking of which makes a black mark against its record. As, however, the bird consumes twice as much animal matter as vegetable, the balance is much in its favor and it accordingly earns protection as well by its economic service as by its beauty and song.

CARDINAL (Cardinalis cardinalis and sub-species).

Length, about 8¾ inches. His size, crest and bright red color serve for instant identification.

Range: Southern United States generally, west to Texas and southern Arizona, north to lower Hudson, northern Ohio, northern Indiana, southern Iowa and southeastern South Dakota; resident.

The cardinal is a notable bird and any locality he chooses for his residence must be considered highly favored. His bright colors, trim form and erectile crest, his clear whistling call, and his fine song are all to his credit. He is a resident of thickets and tangled undergrowth with hanging vines, and, when these are provided and he feels safe from the prowling cat and marauding hawk, he will take up his abode in your garden or back yard as readily as anywhere else. Favor him further by supplying him food and water in winter and you make him your friend indeed. Practically he is a resident wherever found and the sight of his flashing red suit amidst snow covered bushes is a memorable picture. The cardinal used to be a favorite cage bird in the Southern States and the business of trapping him for market, especially about the large southern cities, was common. The bird is now protected by law as it should be, and the sight of a cardinal behind prison bars has become rare indeed. How many thousands were sacrificed for hat gear we shall never know but happily this practice too is fast disappearing.

By preference the cardinal is a vegetarian, and about seven-tenths of its food consists of vegetable matter in the form of seeds, berries, etc. But it also eats many insects, potato beetles, cotton worms, boll worms, cotton-boll weevils, codling moths and many other scarcely less note worthy. Mr. McAtee in attempting to sum up all the economic facts, declares that the bird does at least fifteen times as much good as harm, which is a record to be proud of.

CALIFORNIA QUAIL (Lophortyx californica and varieties).

Length, about 9½ inches. Distinguished from Gambels' quail by the reddish instead of black belly.

Range: Resident in the Pacific Coast region from southwestern Oregon and western Nevada through California and Lower California.

The California quail is one of our most beautiful game birds and the sight of a large covey running daintily along, with crests nodding and fine plumage gleaming in the sun is a sight to remember. Before quail were so much persecuted, covies were common in the gardens of Oakland and other California towns, seemingly as much at home among calla lilies and rosebushes as in the stubble field. The numerous families in the fall associate in bands of three or four hundred, or even more. The California quail has learned one lesson never acquired by our bob-white—to roost in trees and bushes instead of on the ground, and no doubt the safety thus obtained during the hours of darkness is one reason for its great abundance.

This quail is the greatest vegetarian of any of our game birds, the vegetable food eaten by over 600 individuals examined amounting to 95 per cent of the total food consumed. Unfortunately the California quail consumes much grain when germinating and thus damages the growing crop; it also attacks grapes and, while it does not eat a great many, it seriously damages bunches by puncturing a few grapes here and there, so ruining the fruit for market.

Tree Swallow
Scarlet Tanager
Male, upper; female, lower

Cliff or Eaves Swallow
Western Tanager
Male, upper; female, lower

TREE SWALLOW (Iridoprocne bicolor).

Length, about 6 inches. The steel blue upper parts and pure white under parts are distinguishing characteristics.

Range: Breeds from northwestern Alaska and northern Canada south to southern California, Colorado, Kansas, Missouri, and Virginia; winters in central California, southern Texas and Gulf States and south to Guatemala.

In its primitive state the tree swallow used to nest in hollow trees, and in some parts of the country it still continues to do so. Early in the settlement of the country it saw the advantage of putting itself under man's protection, and now no bird is quicker to respond to an invitation to nest in a box dedicated to its use. The bird lover within the range of the species may secure an interesting tenant or two by the expenditure of a little trouble and labor, since the bird is not a bit fastidious as to its domicile, providing it is weather tight. Tree swallows arrive from the south early in April and soon begin to nest. In the fall they gather in great flocks preparatory to their departure, and may then be seen by hundreds perched on telegraph wires. As is the habit with swallows generally, tree swallows migrate by day feeding as they go, and a flock passing swiftly south presents to the casual observer an every day appearance well calculated to deceive. Watch the flock as it crosses the road and passes from field to field and you will notice that while the line of flight has many a twist and turn it trends steadily to the south and that no individual takes the back track.

The tree swallow consumes vast numbers of gnats, flying ants, beetles, mosquitoes and other flying insects. It exhibits a rather curious departure from the traditions of its kind in that it appears to be very fond of the berries of the bayberry or wax myrtle. It also often chooses these bushes for a roosting place at night.

SCARLET TANAGER (Piranga erythromelas).

Length, about 7¼ inches. The scarlet coat and black wings and tail mark this bird out from all others.

Range: Breeds from southern Canada south to southern Kansas, northern Arkansas, Tennessee, northern Georgia and mountains of Virginia and South Carolina; winters from Colombia to Bolivia and Peru.

The tanagers are strictly an American family, and as their bright colors might seem to suggest, they originated in the Tropics to which most of the numerous species are confined. In fact the gleam of scarlet from the coat of this tanager in our somber woods always seems a little out of place as though the bird were an alien. But it is wholly at home with us, and, indeed, does not hesitate to make its summer residence still farther north in Canada. Curiously enough the nearest relatives of the brilliant tanagers in the bird world are the plainly colored sparrows. The chirp-churr of the tanager is a familiar call note in our northern woods, while its song is one of the sweetest; so that altogether this species is to be classed as a notable member of our bird world.

In some localities it is accused of eating honey bees, but to offset this local habit it devours the potato-beetle and many other beetles and a great variety of caterpillars. Blueberries and other small berries also form an important part of its food.

CLIFF SWALLOW (Petrochelidon lunifrons and sub-species).

Length, about 6 inches. The rufous upper tail coverts serve to distinguish this swallow from other species.

Range: Breeds from central Alaska and northern Canada south over the United States (except Florida) and to Guatemala; winters in South America.

The cliff and the barn swallow are members in good standing of the original guild of masons, and their clever constructive work in nest building with mud pellets will bear the severest professional inspection. Through much of the west the cliff swallow still attaches its mud house to the faces of cliffs as from time immemorial, and it was not until the farmers' house and barn offered a satisfactory substitute for granite and sandstone bluffs, that the bird became really numerous in our eastern States. In some localities this swallow is not a welcome guest about the homestead as its nest is apt to contain parasites which the good housekeeper fears. Such parasites, however, are not to be dreaded as they will live only on birds. The cliff swallow performs invaluable service to man since its food consists wholly of insects, and among them are many pestiferous kinds, such as leaf bugs, leaf-hoppers and the boll weevil. Whoever then protects this and other species of swallows and encourages their presence on their premises does good and patriotic service and can moreover be sure of adequate reward.

WESTERN TANAGER (Piranga ludoviciana).

Length, about 7 inches. The combination of orange-red head, black back, and yellow under parts are distinctive.

Range: Breeds from northeastern British Columbia, southwestern Mackenzie and southwestern South Dakota to the mountains of southern California and New Mexico; winters from central Mexico to Guatemala.

Discovered in Idaho by Lewis and Clarke in 1806, this tanager has thus been known more than a hundred years in which time it has become one of the most familiar of western birds. It is a common inhabitant of both the western Rocky Mountains and the Sierra Nevada, and is very much at home among the pine woods of which it is the brightest ornament. In general its habits are like those of its scarlet cousin, and it also has a sweet song very similar in general effect. In California this tanager has acquired an evil reputation by attacks on the cherry crop, and there is no doubt that when it assembles in large numbers in the fruit districts it is the cause of heavy loss to small fruit growers. Under ordinary circumstances, however, the greater part of its food consists of insects, many of them harmful, and it is only fair to balance the good the bird does against the harm. Two very harmful families of beetles, whose larvæ are wood borers and do much damage to trees and other plants, are represented in the food. The planting of berry bearing trees near the orchard would no doubt prevent much of the loss, occasioned by this bird, which by no means occurs every year. For the rest the fruit grower must be allowed to protect his fruit in the best and most effective way.

YELLOW-HEADED BLACKBIRD
Male, upper; female, lower
STARLING

COWBIRD
Male, upper; female, lower
CHIMNEY SWIFT

YELLOWHEAD (Xanthocephalus xanthocephalus).

Length, about 10 inches. Our only blackbird with a yellow head.

Range: Confined to western North America. Breeds from southern British Columbia, southern Mackenzie, southwestern Keewatin, and northern Minnesota to southern California and Arizona, east to southern Wisconsin, Illinois and Indiana; winters from southwestern California, southern Arizona, southeastern Texas, and southwestern Louisiana south into Mexico.

Apparently Nature started out with the intention of making an oriole but decided to make a blackbird instead—and behold the yellowhead. He is a sociable chap and nests in great companies in the tule swamps of the west. The yellowhead's voice is harsh and guttural and his vocal efforts have been well characterized as a maximum of earnest effort with a minimum of harmony. Late in midsummer when the young are on the wing, old and young betake themselves to the uplands, grain fields, pastures and corrals, associating as often as not with redwings and Brewer's blackbirds. The yellowhead feeds principally upon insects, grain and weed seed, and does not attack fruit or garden produce; but it does much good by eating noxious insects and troublesome weeds; where too abundant it is likely to be injurious to grain.

(See Biol. Surv. Bul. No. 13, 1900, p. 32.)

COWBIRD (Molothrus ater).

Length, about 8 inches. Male glossy black, head, neck and breast brown. Female brownish gray.

Range: Breeds from southern British Columbia, southern Mackenzie and southeastern Canada south to northern California, Nevada, northern New Mexico, Texas, Louisiana and North Carolina; winters from southeastern California and the Ohio and Potomac Valleys to the Gulf and to central Mexico.

Chapman calls the cowbird a villain—but is not the villain in the piece often the most interesting character on the stage? Thus our cowbird, short as he is of manners and morals, cannot fail to interest the bird lover. He is full of idiosyncrasies that keep one guessing. Why for instance his close association with the peaceful cow? Why his ludicrous attempts to sing, he who has not a thread of music in his whole make-up? How did Madame Cowbird come to lapse from the paths of virtue and, in place of building a nest of her own, foist her eggs and the care of her offspring on smaller and better principled birds to their detriment? Leaving these conundrums for wiser heads to solve, I must say that the cowbird seems to have chosen the smooth path to prosperity. It makes an easy livelihood, having no parental cares or worries, and is common and widely distributed. The farmer seems to have little to complain of in respect to the bird's food habits.

(See Biol. Surv. Bul. 13, p. 29, 1900.)

STARLING (Sturnus vulgaris).

Length, about 8½ inches. General color dark purple or green with reflections; feathers above tipped with creamy buff. In flight and general appearance unlike any native species.

Range: At present most numerous near New York City. Has spread to Massachusetts, Connecticut, New Jersey, Pennsylvania, Maryland, Virginia and recently to the District of Columbia; resident where found, though wandering southward in winter in search of food.

The Old World has sent us two bird pests, the English sparrow and the starling. Although, up to the present time, we cannot convict the starling of having done any great damage he has proclivities which make him potentially very dangerous. Introduced into New York in 1890, the original sixty have multiplied many fold and spread in all directions till now they occupy territory hundreds of miles square, and are multiplying and spreading faster than ever. On the north they have entered Massachusetts and Connecticut, and on the south they have reached Richmond, though only in migration. Even as I write the calls of a flock of 200 or more can be heard coming from a neighboring park, but as yet the bird has not elected to summer in the National Capital. The starling is a hardy, prolific bird and is also aggressive. Like the English sparrow it associates in flocks, which is a great advantage in bird disputes. There is little doubt that the effect of its increase and spread over our country will prove disastrous to native species such as the bluebirds, crested flycatchers, swallows, wrens and flickers, all valuable economic species, which nest in cavities as does the starling. Then too the starling has a taste for grain and small fruits, especially cherries, which will not commend it to our farmers and orchardists.

CHIMNEY SWIFT (Chætura pelagica).

Length, rather less than 5½ inches. Too well known by its peculiar flight and habits to need describing.

Range: Known only in eastern North America. Breeds from southeastern Saskatchewan, Manitoba, Quebec, and Newfoundland south to Gulf Coast; west to Plains from eastern Montana to eastern Texas; winters south of the United States.

The popular name of this bird, chimney swallow, embodies an error since the bird not only is not a swallow but is not even distantly related to the swallow family. Unlike the humming birds as the chimney swift is in appearance and habits, it is structurally not far removed from them. Like the swallows it is an indefatigable skimmer of the air and like them it earns a debt of gratitude by destroying vast numbers of our winged enemies, which its unsurpassed powers of flight enable it to capture. Indeed, chimney swifts eat nothing but insects, and no insect that flies is safe from them, unless it be too large for them to swallow. In June swifts may be seen gathering twigs for nest material. They disdain to pick these up from the ground but seize the coveted twig with their strong feet and break it off from the terminal branch when in full flight. By means of a sticky saliva secreted for the purpose the swift glues these twigs to the sides of the chimney in the form of a shallow nest. Although not generally known, swifts roost in chimneys and cling to the walls by using the sharp pointed tail as a prop, as do many woodpeckers in ascending trees. Any bird lover may secure distinction by solving an ornithological riddle and telling us where our chimney swifts spend the winter. They come in spring, they go in fall and at present that is about all we know of the matter, save that they do not hibernate in hollow trees, as many have believed.

MARSH HAWK
OSPREY

TURKEY BUZZARD
BALD EAGLE
Male, upper; immature, lower

MARSH HAWK (Circus hudsonius).

Length, about 19 inches. The ashy upper parts, white rump and long tail of the adult male sufficiently distinguish this hawk; while the fuscous upper parts and buff under parts much streaked with brown distinguish the female and young.

Range: Breeds through much of Canada, south to the middle United States; winters in the United States, especially in the south.

Though not exclusively a marsh frequenter, as its name might seem to imply, this hawk prefers open country, and its favorite hunting grounds are meadow and marsh, in which it nests on the ground. It flies rather low, the better to see and drop suddenly upon the luckless meadow mice—its favorite food. Unfortunately small birds form part of its fare, and there are localities, like Cape Cod and Martha's Vineyard, in Massachusetts, where this hawk has earned a bad reputation as a destroyer of poultry and game. However, over much the larger part of the vast territory it inhabits, the marsh hawk is a rodent eater, and the debt of gratitude it lays upon the farmer is large. This debt should be fully discharged by preserving the bird and encouraging its presence unless it is caught committing overt acts. In other words, as this hawk is very beneficial over most of its range, individual hawks should be presumed to be innocent unless detected in transgression.

OSPREY (Pandion haliætus carolinensis).

Length, about 23 inches. The great size, brown upper parts and white under parts are distinguishing features.

Range: Breeds from northwestern Alaska, and central Canada south to the Gulf Coast, western Mexico and Lower California; winters from the southern United States, Lower California and Mexico to Central America.

A thin, high pitched whistle, the alarm as well as the call note of the osprey, frequently directs the attention of the passer by to this fine hawk as he circles high in air on the watch for fish. The bird is common along our coast and to some extent along our rivers, and his bulky nest of twigs, often in low trees or sometimes on the ground, frequently attests his former presence when he is wintering elsewhere. When unmolested, ospreys return to their own strip of territory year after year, and they and their deseendants probably rear their young in the same nest for generations, repairing it from season to season as necessity requires. The osprey lives solely on fish which he catches himself—he disdains carrion—diving from mid air upon his quarry and often burying himself in the water momentarily by the force of his descent. He often fastens his talons in the back of a large fish, which proves too heavy, and he has to abandon it; but usually he succeeds in carrying his prey to his nest, though his slow and labored wing-beats often prove how heavy is his load. Notwithstanding the fact that the osprey makes no direct return for the fish he eats, no one can doubt that indirectly he renders a full equivalent. Visitors to the seashore, and even old residents, never tire of watching his superb flight and interesting habits, and his plunge, after his quarry, whether successful or unsuccessful, is a sight to be remembered.

TURKEY BUZZARD (Cathartes aura septentrionalis).

Length, about 30 inches. The naked head and neck and glossy black plumage are distinctive.

Range: Extends from southwestern Canada, northern Minnesota, southern New York and south into northern Mexico and Lower California.

This buzzard displays superb powers of flight which even the eagle cannot surpass, and no small part of its time is spent in the upper air, describing great circles on motionless wings as if for the mere pleasure of flight. Let another buzzard, however, discover a careass, and the movements of our æronaut as he hastens to the feast are at once noted by his next neighbor, and his by a third, till the carrion feeders of a wide territory are assembled. Sight and not smell, then, is depended on by the buzzard to guide him to his food. Though of great strength and provided with a formidable bill, the buzzard rarely, if ever, attacks living animals, unless they are disabled, but depends upon death to provide for his wants. No doubt his ability to fast is as great as his capacity for gorging himself when occasion offers, and he must often go for days without food. As a scavenger the buzzard does good service and no sound reason exists for destroying him, notwithstanding the fact that occasionally the bird may be instrumental in spreading hog cholera by transporting the germs on his feet and bill. This disease, however, may be, and no doubt often is, transmitted by the feet of so many other birds, especially the English sparrow, and of so many mammals, especially rats, and even on the footwear of man himself as to lead to the belief that if every buzzard in the hog cholera districts were to be sacrificed no perceptible diminution of the disease would follow. The bird should continue to enjoy the protection which is at present accorded it in nearly every state of the Union.

BALD EAGLE (Haliætus leucocephalus and sub-species).

Length, about 33 inches. The white head (adult) and naked tarsus distinguish this species from the golden eagle.

Range: A resident of Alaska, much of Canada, and the whole of the United States in suitable localities.

Though a fisherman by profession, the white head is by no means the master of his craft that the osprey is. In fact he never fishes for himself so long as he can rob the more skilful and more industrious fish hawk. When necessity compels, however, he fishes to some purpose, and much after the manner of his erstwhile victim, the fish hawk. He is far less fastidious in his food habits than that bird, however, and often gorges himself until he cannot fly on dead fish gathered along shore, especially on the great salmon rivers of the northwest. When fish are scarce and waterfowl are plentiful, the white head has little difficulty in living off them. Complaint is made in Alaska, where the bald eagle is numerous, that he sometimes interferes with blue fox farming by killing the animals for food. Though the blue fox is not a large animal he is by no means a pigmy, and the bird who would make him his quarry must needs possess both strength and determination. As this eagle has been taken for our National emblem it would seem to be the part of patriotism to condone his faults and remember only his virtues, among which are a magnificent presence, superb powers of flight, and his devoted care of his family.

Black-crowned Night Heron
Male, upper; young bird, lower
Herring Gull
Adult in winter, upper
Adult in summer, lower

Great Blue Heron
Common Tern

BLACK-CROWNED NIGHT HERON (Nycticorax nævius nævius).

Length, about 24 inches. The black crown distinguishes it from its relative, the yellow-crowned night heron.

Range: Breeds from northern Oregon, southern Wyoming, southern Manitoba, and central Quebec south to Patagonia; winters from northern California and Gulf States southward.

Given for a roosting place a suitable stand of leafy trees, especially evergreens, conveniently near a stream or pond that harbors fish, frogs and tadpoles, and any locality may have its colony of night herons. As its name implies, this heron is a bird of the night, not leaving its roost till dusk when, with frequent iteration of its hoarse quawk, it wings its way in the gathering gloom straight to its feeding place. So rarely is the bird about in daylight that a large colony may exist for years near a town or large city, and not above a dozen individuals have an inkling of its existence. True to its sociable instincts, the night heron by preference nests in colonies, and several pairs often place their rude nests of sticks in the same tree; or, in the absence of trees, as in the extensive tule swamps of the far west, where other conditions are ideal for herons, they nest on the ground or on the prostrate tules, hundreds of pairs being associated together.

This heron sometimes feeds on field mice, but it eats too many fish to please the fisheulturist, and after it has once learned the way to a hatchery strong measures are needed to discourage its activities.

HERRING GULL (Larus argentatus).

Length, about 24 inches. Deep pearl gray above; much of rest of plumage white. Not readily distinguished in life from its allies.

Range: Breeds in Alaska and in Arctic regions south to southern British Columbia, southern Alberta, northern North Dakota, central Wisconsin southern Ontario, northern New York, and Maine; winters from southern British Columbia to Lower California and western Mexico, and from Gulf of St. Lawrence and Great Lakes south to Bahamas, Yucatan, and coast of Texas.

All things considered, the herring gull is probably the best known of the family by reason of its abundance and wide distribution. Moreover, this is the gull most frequently noticed by passengers as it follows in the wake of our ocean and trans-Atlantic steamers. It breeds no farther south than the coast of Maine, but in winter it is very numerous along the Atlantic coast and in many of our inland ponds. It does excellent service as a scavenger in our harbors, venturing fearlessly among the shipping to secure anything edible that may find its way overboard. The services of this and other gulls in such a capacity are so valuable that their destruction under any pretense is to be deprecated. When the craze for feathered hat gear was at its height thousands of gulls, without regard to species, were killed for millinery purposes, but it is to be hoped that, now the sale of their feathers is illegal practically everywhere in the United States, the gulls will rapidly increase.

(See Biol. Surv. Bul. 17, pp. 53, 80.)

GREAT BLUE HERON (Ardea herodias and sub-species).

Length, from 42 to 50 inches.

Range: Breeds from the southern Canadian provinces south to southern Lower California, southern Mexico and South Atlantic States; winters from Oregon, the Ohio Valley and Middle States south to the West Indies, Panama and Venezuela.

When one sees a large bluish bird, with long neck and stilt-like legs, standing motionless by river, pond or lake, or slowly wading in the shallows, he may be sure he has before him the great blue heron, and a notable bird he is in many ways. Wary as this heron is and keen to scent danger, he offers so tempting a mark as he wings his way slowly along, with head and neck drawn in against the body and long legs trailing behind, or as he stands motionless watching for game, that he is frequently shot "just for the fun of it." This wanton taking of life is never justifiable, but when the life cut short represents so much beauty and grace as are embodied in this stately bird, the crime seems doubly heinous. Naturally this heron is much less common than he used to be.

Small fish, frogs, tadpoles, and snakes form the bulk of his food, and in some regions he is a determined foe of mice and gophers, and the sight of a heron in the midst of a dry pasture or in a stubble field watching for a gopher to emerge from his hole is very common.

(See Biol. Surv. Bul. 31, p. 52; also Bul. 17, p. 217.)

COMMON TERN (Sterna hirundo).

Length, about 15 inches. The pearl-gray breast and belly distinguish the adult of this tern from its relatives. The outer web of the outer tail feathers is darker than the inner web; the reverse is true of Forster's Tern, its nearest ally.

Range: Breeds from Great Slave Lake, central Keewatin and southern Quebec south to southwestern Saskatchewan, northern North Dakota, southern Wisconsin, northern Ohio and North Carolina; winters from Florida to Brazil.

Our common tern is, alas, common no longer. The Atlantic coast is peculiarly fitted to be the home of the terns by reason of the extensive shallows and the great number of sandy islands on which terns and gulls used to breed in absolute safety. At the bidding of fashion, however, thousands of these beautiful creatures were slaughtered till the sand was red with their blood and island colonies that used to number thousands were exterminated. No excuse serves to palliate the crime of the wholesale murder of these graceful sea swallows, as they are aptly termed, which used to make our shores so attractive by their presence. But the tide seems to have turned, partly at least. The Government has set aside islands as breeding resorts and places of refuge and, through the activity of Audubon Societies and of individual workers, a certain measure of safety seems now assured to these persecuted birds. It may even prove possible, by the bird sanctuary plan, to increase their numbers again and make them a familiar sight along our deserted shores. Could the sentiment of the women of the United States be united for their protection, all doubt as to the future of these beautiful creatures would be removed, but so long as the arbiter of Fashion decrees feathers on hats, so long will the eternal vigilance of their friends be needed to assure the safety of the small remnant of this species and its kindred.

Great Horned Owl
Coot

Wood Duck
Male, upper; female, lower
Spotted Sandpiper

GREAT HORNED OWL (Bubo virginianus and sub-species).

Length, about 22 inches. The great size and long ear tufts sufficiently distinguish this owl.

Range: Resident over the greater part of North and South America.

This, our largest owl, inhabits heavily forested and unsettled regions and is becoming more and more rare in thickly populated areas. It is well known by its far reaching call—"hoo-hoo-hoo-hoo"—which is heard best in the still small hours of the night, when it echoes across the expanse of canyon and forest in the far west.

This owl destroys many partridges and other game birds, and unhoused poultry is never safe from its nocturnal attacks. Its deeds are those of darkness, since usually it hunts only at night, though when disturbed in the daytime it can see well enough to take good care of itself. Its bill of fare is a long one and includes many kinds of mammals and birds. It is one of the few creatures which when hungry do not hesitate to attack the skunk, and it appears to have no great difficulty in killing this rather formidable little beast. That it does not always do so with entire impunity is evident from the odor frequently attaching to its feathers. Its destruction of rodents entitles it to our gratitude, especially when it kills pocket gophers, rats, mice, ground squirrels and rabbits. In some parts of the west rabbits are responsible for much damage to orchards and crops and consequently their reduction is a blessing. Nevertheless the protection of this big and fierce owl cannot be recommended on sound economic grounds.

COOT (Fulica americana).

Length, about 15 inches. The slate-colored plumage, with blackish head and neck, white bill, and scalloped toes mark this bird apart from all others.

Range: Breeds from southern Canada south to Lower California, Texas, Tennessee and New Jersey; also in southern Mexico and Guatemala; winters from southern British Columbia, Nevada, Utah, Ohio Valley and Virginia south to Panama.

The coot, or mud-hen, is a sort of combination of duck, gallinule and rail, and withal is a very interesting bird. Fortunately for the coot, its flesh is little esteemed, and by many, indeed, is considered unfit for human consumption. The coot is thus passed by in contempt by most sportsmen, and in some regions it is as tame as can well be imagined, swimming within a few feet of the observer with entire unconcern. Under other circumstances, however, as in Louisiana, where it is shot for food under the name *poule d'eau*, it becomes as wild as the most wary of ducks. It frequents both salt and fresh water, preferably the latter. The mud-hen is one of the few American birds that occasionally visits the distant Hawaiian Islands in fall and winter. Finding conditions there to their liking, some of the immigrants, probably centuries ago, elected to remain and found a new colony, and there, in the fresh water ponds of the island archipelago, their descendants still live and thrive.

The food of the coot consists almost entirely of water plants of no use to man. There would seem, therefore, to be no excuse for killing or disturbing the bird in any way.

WOOD DUCK (Aix sponsa).

Length, about 19 inches. The elongated crest of feathers and variegated plumage of white and brown, spotted with chestnut, ochraceous and steel blue are characteristic.

Range: Breeds from Washington to middle California, and from Manitoba and southeastern Canada to Texas and Florida; winters chiefly in the United States.

It can be said of this duck, as of no other, that it is our very own, since most of the breeding area it occupies is within our territory, and by far the greater number of the species winter within the United States. The story of its former abundance on our ponds and streams and of its present scarcity is a sad commentary on our improvidence and a warning for the future. Happily, it is not yet too late to save this most beautiful of our ducks, and under proper regulations it may be expected not only to hold its own, but to increase until it is once more a proper object for the skill of sportsmen. Under present conditions all true sportsmen should refrain from its further pursuit.

As is well known, the wood duck is one of the few wildfowl that builds its nest in hollow trees, and the security thus provided for the young is one of the factors to be relied upon for the increase of the species. North, south, east and west, the States of every section are, or should be, interested in the preservation of this distinctively American duck, and should make suitable regulations for its welfare and see to their enforcement.

SPOTTED SANDPIPER (Actitis macularia).

Length, about 6 inches. The "tip up," with its brownish gray upper parts and white under parts and its teetering motion, is too well known to need description.

Range: Breeds in northwestern Alaska and in much of northern Canada south to southern California, Arizona, southern Texas, southern Louisiana and northern South Carolina; winters from California, Louisiana and South Carolina to southern Brazil and Peru.

The little "tip up," as it is appropriately named, from its quaint nodding motion, unduly favors no one section or community but elects to dwell in every region suited to its needs from Alaska to Florida. It is doubtless more widely known than any other of our shore birds, and as it takes wing when disturbed, its "wit, wit" comes to us from beach, river side, and mill pond, from one end of the land to the other. It is the only shore bird that habitually nests in cornfields and pastures, and its hand some buff eggs spotted with chocolate are well known to the farmer's boy everywhere. Much is to be said in favor of the food habits of the little tip up, as the bird includes in its diet army worms, squash bugs, cabbage worms, grasshoppers, green flies and crayfishes. Having thus earned a right to be numbered among the farmers' friends, the bird should be exempt from persecution. The tiny morsel of flesh afforded by its plump little body, when the bird has been shot, is in no sense an adequate return for its services when alive and active in our behalf.

Photo by George Shiras, 3rd

FLORIDA QUAIL TAKING THEIR OWN PICTURES

Unexpectedly a flock of seven quail discovered the seeds put out for smaller birds. Six pictures were taken by Mr. Shiras pulling the string and two the quail took during his absence. In the above group are four cocks and two females. Note that the cock in the center, by swallowing a grain attached to a string, releases the shutter of the camera.

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THE NATIONAL GEOGRAPHIC MAGAZINE

A GEOGRAPHIC ACHIEVEMENT

THROUGH the courtesy of the Secretary of Agriculture, the NATIONAL GEOGRAPHIC MAGAZINE reprints on pages 669-697 of this number "Fifty Common Birds of Farm and Orchard," which was prepared under the direction of Henry W. Henshaw, Chief of the Bureau of the Biological Survey, and published as Farmers' Bulletin 513 of the U. S. Department of Agriculture. The illustrations are all from drawings made by Mr. Louis Agassiz Fuertes, the skillful painter of American birds.

To obtain the exquisite and delicate colors of the pictures, which are such faithful portrayals of the birds, the printed sheets had to pass through the presses eight times, therefore representing nearly two million impressions. This immense amount of work naturally involved a very large expense, but the NATIONAL GEOGRAPHIC MAGAZINE felt justified in spending the many thousands of dollars to republish this wonderful bulletin in order that every reader of the GEOGRAPHIC may have in the household this helpful guide and the accurate and useful information that it contains. The huge outlay required for this colored work would, however, not have been possible but for the great recent increase in the circulation of the Magazine, which has enabled us to bring the cost per copy within reach by distributing the expense over the larger edition.

With the help of these beautiful pictures and clear text the reader will be able easily to identify fifty of our common birds. While this valuable contribution will be specially serviceable in the summer months, when our readers spend more time in the open, it will prove an equally convenient introduction to some of our feathered friends throughout the entire year.

Just as remarkable as the fifty beautiful pictures is the quantity of concise information given about each individual bird, and which is the result of long study by some of the best bird men and women in America. For many years the experts of the Biological Survey have been making accurate tests to determine which birds are useful to man and which destructive. The contents of the stomachs of many thousands of specimens have been analyzed with a view of finding whether the bird helps the farmer by eating injurious insects and noxious weeds, or hurts the farmer by eating his fruits and grain.

These investigations have shown that, with rare exceptions, birds are useful everywhere, and that without their help successful agriculture would be impossible. "The activity of birds in the pursuit of insects is still further stimulated by the fact that the young of most species, even those which are by no means strictly insectivorous, require great quantities of animal food in the early weeks of existence, so that during the summer months—the flood time of insect life—birds are compelled to redouble their at-

tacks on our insect foes to satisfy the wants of their clamorous young" (see page 671). "A nest with four young of the chipping sparrow was watched at different hours on four days. In the seven hours of observation 119 feedings were noted, or an average of 17 feedings per hour, or 4¼ feedings per hour to each nestling. This would give for a day of 14 hours at least 238 insects eaten by the brood" (see page 682).

Even our hawks and owls, with the exception of Cooper's hawk (see page 694) and one or two others, are desirable, and their presence around a garden or farm should be welcomed, because with their voracious appetites they keep down the numbers of mice and rats and other pests which may torment the country home. As many as 100 grasshoppers have been found in the stomach of a Swainson's hawk, representing a single meal; and in the retreat of a pair of barn owls have been found more than 3,000 skulls, 97 per cent of which were of mammals, the bulk consisting of field mice, house mice, and common rats (see page 670).

A lack of knowledge of the value of certain birds may prove disastrous and cause the destruction of valuable birds which cannot be replaced in years. Some years ago the legislature of the State of Pennsylvania offered a bounty on hawks and owls, which resulted in the killing of over 100,000 of these birds. As almost all of those killed were beneficial, it was calculated by Dr. C. Hart Merriam, then chief of the U. S. Biological Survey, that the State of Pennsylvania sustained a loss of nearly four million dollars in eighteen months. The legislature soon realized its mistake and abolished the bounty.

Quite apart from any question of sentiment, the preservation of our bird life is a matter of great national importance, and every effort should be made to assist our policemen of the air in keeping Nature's balance true.

The bird portraits in colors were printed by the Sackett & Wilhelms Lithograph Company of Brooklyn, N. Y.

LIST OF BIRDS DESCRIBED AND INDEX

FIFTY COMMON BIRDS OF FARM AND ORCHARD

Prepared under the direction of Henry W. Henshaw, Chief of the Biological Survey, as Bulletin 513 of the U. S. Department of Agriculture, and reprinted in full in the NATIONAL GEOGRAPHIC MAGAZINE, *pages 669-697, by special permission of the Secretary of Agriculture.*

INTRODUCTION.

This bulletin is intended to serve the very practical purpose of enabling our farmers and their boys and girls to identify the birds that frequent the farm and orchard. The material prosperity of State and Nation depends largely on agriculture, and any agent that serves to increase the size of crops and insure their certainty is of direct interest and importance to the farmer. Birds constitute one of the most valuable of these agents, since they depend largely for their food on insects which are among the farmer's most dreaded foes.

Entomologists have estimated that insects yearly cause a loss of upwards of $700,000,000 to the agricultural interests of the United States. Were it not for our birds the loss would be very much greater, and indeed it is believed that without the aid of our feathered friends successful agriculture would be impossible. A knowledge of the birds that protect his crops is, therefore, as important to the farmer as a knowledge of the insect pests that destroy them. Such knowledge is the more important because the relation of birds to man's interests is extremely complex. Thus, while it may be said that most of our birds are useful, there are only a few of them that are always and everywhere useful and that never do harm. Insectivorous birds, for instance, destroy, along with a vast number of harmful insects, some parasitic and predatory kinds. These latter are among Nature's most effective agents for keeping destructive insects in check. To the extent, then, that birds destroy useful parasitic insects, they are harmful. But, taking the year round, the good they do by the destruction of insects injurious to man's interests far outweighs the little harm they do. It may be said, too, that of the birds usually classed as noxious there are very few that do not possess redeeming traits. Thus the crow is mischievous in spring and sorely taxes the farmer's patience and ingenuity to prevent him from pulling up the newly planted corn. Moreover, the crow destroys the eggs and young of useful insectivorous and game birds; but, on the other hand, he eats many insects, especially white grubs and cutworms, and destroys many meadow mice, so that in much (although not all) of the region he inhabits the crow must be considered to be more useful than harmful. Most of the hawks and owls even—birds that have received so bad a name that the farmer's boy and the sportsman are ever on the alert to kill them—are very useful because they destroy vast numbers of insects and harmful rodents.

Birds occupy a unique position among the enemies of insects, since their powers of flight enable them at short notice to gather at points where there are abnormal insect outbreaks. An unusual abundance of grasshoppers, for instance, in a given locality soon attracts the birds from a wide area, and as a rule their visits cease only when there are no grasshoppers left. So also a marked increase in the number of small rodents in a given neighborhood speedily attracts the attention of hawks and owls, which, by reason of their voracious appetites, soon produce a marked diminution of the swarming foe.

America is greatly favored in the number and character of its birds, which not only include some of the gems of the bird world, as the warblers and humming birds, but

on the whole embrace few destructive species. Not only do many birds satisfy our esthetic sense through their beautiful plumage and their sweet voices, but they are marvelously adapted to their respective fields of activity. No other creatures are so well fitted to capture flying insects as swallows, swifts, and nighthawks. Among the avian ranks also are wrens, trim of body and agile of movement, that creep in and out of holes and crevices and explore rubbish heaps for hidden insects. The woodpecker, whose whole body exhibits wonderful adaptation of means to end, is provided with strong claws for holding firmly when at work, a chisel-like bill driven by powerful muscles to dig out insects, and a long extensible tongue to still further explore the hidden retreats of insects and drag forth the concealed larvæ, safe from other foes. The creepers, titmice, warblers, flycatchers, quails, doves, and other families have each their own special field of activity. However unlike they may be in appearance, structure, and habits, all are similar in one respect—they possess a never flagging appetite for insects and weed seeds.

One of the most useful groups of native birds is the sparrow family. While some of the tribe wear gay suits of many hues, most of the sparrows are clad in modest brown tints, and as they spend much of the time in grass and weeds are commonly overlooked. Unobtrusive as they are, they lay the farmer under a heavy debt of gratitude by their food habits, since their chosen fare consists largely of the seeds of weeds. Selecting a typical member of the group, the tree sparrow, for instance, one-fourth ounce of weed seed per day is a conservative estimate of the food of an adult. On this basis, in a large agricultural State like Iowa tree sparrows annually eat approximately 875 tons of weed seeds. Only the farmer, upon whose shoulders falls the heavy burden of freeing his land of noxious weeds, can realize what this vast consumption of weed seeds means in the saving and cost of labor. Some idea of the money value of this group of birds to the country may be gained from the statement that the total value of the farm products in the United States in 1910 reached the amazing sum of $8,926,000,000. If we estimate that the total consumption of weed seed by the combined members of the sparrow family resulted in a saving of only 1 per cent of the crops—not a violent assumption—the sum saved to farmers by these birds in 1910 was $89,260,000.

The current idea in relation to hawks and owls is erroneous. These birds are generally classed as thieves and robbers, whereas a large majority of them are the farmers' friends and spend the greater part of their long lives in pursuit of injurious insects and rodents. The hawks work by day, the owls chiefly by night, so that the useful activities of the two classes are continued practically throughout the 24 hours. As many as 100 grasshoppers have been found in the stomach of a Swainson's hawk, representing a single meal; and in the retreat of a pair of barn owls have been found more than 3,000 skulls, 97 per cent of which were of mammals, the bulk consisting of field mice, house mice, and common rats. Nearly half a bushel of the remains of pocket gophers—animals which are very destructive in certain parts of the United States—was found near a nest of this species. The notable increase of noxious rodents during the last few years in certain parts of the United States and the consequent damage to crops are due in no small part to the diminished number of birds of prey, which formerly destroyed them and aided in keeping down their numbers. A few hawks are injurious, and the bulk of the depredations on birds and chickens chargeable against hawks is committed by three species—the Cooper's hawk, the sharp-shinned hawk, and the goshawk. The farmer's boy should learn to know these daring robbers by sight, so as to kill them whenever possible.

From the foregoing it will at once appear that the practice of offering bounties indiscriminately for the heads of hawks and owls, as has been done by some States, is a serious mistake, the result being not only a waste of public funds but the destruction of valuable birds which can be replaced, if at all, only after the lapse of years.

As a rule birds do not live very long, but they live fast. They breathe rapidly and have a higher temperature and a more rapid circulation than other vertebrates. This is a fortunate circumstance, since to generate the requisite force to sustain their active bodies a large quantity of food is necessary, and as a matter of fact birds have to devote most of their waking hours to obtaining insects, seeds, berries, and other kinds of food. The activity of birds in the pursuit of insects is still further stimulated by the fact that the young of most species, even those which are by no means strictly insectivorous, require great quantities of animal food in the early weeks of existence, so that during the summer months—the flood time of insect life—birds are compelled to redouble their attacks on our insect foes to satisfy the wants of their clamorous young.

Field observations of the food habits of birds serve a useful purpose, but they are rarely accurate enough to be fully reliable. The presence of certain birds in a corn or wheat field or in an orchard is by no means proof, as is too often assumed, that they are devastating the grain or fruit. They may have been attracted by insects which, unknown to the farmer or orchardist, are fast ruining his crop. Hence it has been found necessary to examine the stomachs and crops of birds to ascertain definitely what and how much they eat. The Biological Survey has in this way examined upward of 50,000 birds, most of which have been obtained during the last 25 years from scientific collectors, for our birds are too useful to be sacrificed when it can possibly be avoided, even for the sake of obtaining data upon which to base legislation for their protection.

It is interesting to observe that hungry birds—and birds are hungry most of the time—are not content to fill their stomachs with insects or seeds, but after the stomach is stuffed until it will hold no more continue to eat till the crop or gullet also is crammed. It is often the case that when the stomach is opened and the contents piled up the pile is two or three times as large as the stomach was when filled. Birds may truly be said to have healthy appetites. To show the astonishing capacity of birds' stomachs and to reveal the extent to which man is indebted to birds for the destruction of noxious insects, the following facts are given as learned by stomach examinations made by assistants of the Biological Survey:

A tree swallow's stomach was found to contain 40 entire chinch bugs and fragments of many others, besides 10 other species of insects. A bank swallow in Texas devoured 68 cotton-boll weevils, one of the worst insect pests that ever invaded the United States; and 35 cliff swallows had taken an average of 18 boll weevils each. Two stomachs of pine siskins from Haywards, Cal., contained 1,900 black olive scales and 300 plant lice. A killdeer's stomach taken in November in Texas contained over 300 mosquito larvæ. A flicker's stomach held 28 white grubs. A nighthawk's stomach collected in Kentucky contained 34 May beetles, the adult form of white grubs. Another nighthawk from New York had eaten 24 clover-leaf weevils and 375 ants. Still another nighthawk had eaten 340 grasshoppers, 52 bugs, 3 beetles, 2 wasps, and a spider. A boat-tailed grackle from Texas had eaten at one meal about 100 cotton bollworms, besides a few other insects. A ring-necked pheasant's crop from Washington contained 8,000 seeds of chickweed and a dandelion head. More than 72,000 seeds have been found in a single duck stomach taken in Louisiana in February.

A knowledge of his bird friends and enemies, therefore, is doubly important to the farmer and orchardist in order that he may protect the kinds that earn protection by their services and may drive away or destroy the others. At the present time many kinds of useful birds need direct intervention in their behalf as never before. The encroachments of civilization on timbered tracts and the methods of modern intensive cultivation by destroying or restricting breeding grounds of birds tend to diminish their ranks. The number of insect pests, on the other hand, is all the time increasing by leaps and bounds through importations from abroad and by migration from adjoin-

ing territories. Every effort, therefore, should be made to augment the numbers of our useful birds by protecting them from their enemies, by providing nesting facilities, and by furnishing them food in times of stress, especially in winter.

Important in this connection is the planting near the house and even in out-of-the-way places on the farm of various berry-bearing shrubs, many of which are ornamental, which will supply food when snow is on the ground. Other species which are not berry eaters, like the woodpeckers, nuthatches, creepers, and chickadees, can be made winter residents of many farms, even in the North, by putting out at convenient places a supply of suet, of which they and many other birds are very fond, even in summer. Hedges and thickets about the farm are important to furnish nesting sites and shelter both from the elements and from the numerous enemies of birds.

Few are aware of the difficulty often experienced by birds in obtaining water for drinking and bathing, and a constant supply of water near the farmhouse will materially aid in attracting birds to the neighborhood and in keeping them there, at least till the time of migration. Shallow trays of wood or metal admirably serve the purpose, especially as birds delight to bathe in them.

Considerable success has been met with in Germany and elsewhere in Europe by supplying artificial nest boxes for birds, and the same method of increasing the number of birds and attracting them to farms and orchards where their services are most needed should be extensively employed in this country. The experiment can the more easily be tried since several firms in the United States are now prepared to make and deliver boxes specially designed for martins, swallows, bluebirds, wrens, woodpeckers, and other species. The average farmer's boy, however, if provided with a few tools, is quite equal to the task of making acceptable boxes for the commoner species, which are far from fastidious as to the appearance of the box intended for their occupancy.

One of the worst foes of our native birds is the house cat, and probably none of our native wild animals destroys as many birds on the farm, particularly fledglings, as cats. The household pet is by no means blameless in this respect, for the bird-hunting instinct is strong even in the well-fed tabby; but much of the loss of our feathered life is attributable to the half-starved stray, which in summer is as much at home in the groves and fields as the birds themselves. Forced to forage for their own livelihood, these animals, which are almost as wild as the ancestral wildcat, inflict an appalling loss on our feathered allies and even on the smaller game birds like the woodcock and bobwhite. If cats are to find place in the farmer's household, every effort should be made by carefully feeding and watching them to insure the safety of the birds. The cat without a home should be mercifully put out of the way.

In the present bulletin 50 of our commoner birds are discussed, including some that are destructive. They inhabit various parts of the country, and it is for the interest of the farmers of the respective localities to be familiar with them. A colored illustration of each species is given so as to enable the reader to identify the bird at a glance and to permit the descriptive text, at best an unsatisfactory method of identification, to be cut down or altogether dispensed with. The birds were drawn from nature by the well-known bird artist, Louis Agassiz Fuertes. The accounts of the birds' habits are necessarily brief, but they are believed to be sufficient to acquaint the reader with the most prominent characteristics of the several species, at least from the standpoint of their relation to man.

BLUEBIRD (Sialia sialis).

Length,* about 6½ inches.

Range: Breeds in the United States (west to Arizona, Colorado, Wyoming, and Montana), southern Canada, Mexico, and Guatemala; winters in the southern half of the eastern United States and south to Guatemala.

Habits and economic status: The bluebird is one of the most familiar tenants of the farm and dooryard. Everywhere it is hailed as the harbinger of spring, and wherever it chooses to reside it is sure of a warm welcome. This bird, like the robin, phoebe, house wren, and some swallows, is very domestic in its habits. Its favorite nesting sites are crannies in the farm buildings or boxes made for its use or natural cavities in old apple trees. For rent the bird pays amply by destroying insects, and it takes no toll from the farm crop. The bluebird's diet consists of 68 per cent of insects to 32 per cent of vegetable matter. The largest items of insect food are grasshoppers first and beetles next, while caterpillars stand third. All of these are harmful except a few of the beetles. The vegetable food consists chiefly of fruit pulp, only an insignificant portion of which is of cultivated varieties. Among wild fruits elderberries are the favorite. From the above it will be seen that the bluebird does no essential harm, but on the contrary eats many harmful and annoying insects. (See Farmers' Bul. 54, pp. 46–48.)

ROBIN (Planesticus migratorius).

Length, 10 inches.

Range: Breeds in the United States (except the Gulf States), Canada, Alaska, and Mexico; winters in most of the United States and south to Guatemala.

Habits and economic status: In the North and some parts of the West the robin is among the most cherished of our native birds. Should it ever become rare where now common, its joyous summer song and familiar presence will be sadly missed in many a homestead. The robin is an omnivorous feeder, and its food includes many orders of insects, with no very pronounced preference for any. It is very fond of earthworms, but its real economic status is determined by the vegetable food, which amounts to about 58 per cent of all. The principal item is fruit, which forms more than 51 per cent of the total food. The fact that in the examination of over 1,200 stomachs the percentage of wild fruit was found to be 5 times that of the cultivated varieties suggests that berry-bearing shrubs, if planted near the orchard, will serve to protect more valuable fruits. In California in certain years it has been possible to save the olive crop from hungry robins only by the most strenuous exertions and considerable expense. The bird's general usefulness is such, however, that all reasonable means of protecting orchard fruit should be tried before killing the birds. (See Farmers' Bul. 54, pp. 44–46.)

* Measured from tip of bill to tip of tail.

RUSSET-BACKED THRUSH (Hylocichla ustulata).

Length, 7¼ inches. Among thrushes having the top of head and tail nearly the same color as the back, this one is distinguished by its tawny eye-ring and cheeks. The Pacific coast subspecies is russet brown above, while the other subspecies is the olive-backed thrush. The remarks below apply to the species as a whole.

Range: Breeds in the forested parts of Alaska and Canada and south to California, Colorado, Michigan, New York, West Virginia (mountains), and Maine; winters from Mexico to South America.

Habits and economic status: This is one of a small group of thrushes the members of which are by many ranked first among American songbirds. The several members resemble one another in size, plumage, and habits. While this thrush is very fond of fruit, its partiality for the neighborhood of streams keeps it from frequenting orchards far from water. It is most troublesome during the cherry season, when the young are in the nest. From this it might be inferred that the young are fed on fruit, but such is not the case. The adults eat fruit, but the nestlings, as usual, are fed mostly upon insects. Beetles constitute the largest item of animal food, and ants come next. Many caterpillars also are eaten. The great bulk of vegetable food consists of fruit, of which two-fifths is of cultivated varieties. Where these birds live in or near gardens or orchards, they may do considerable damage, but they are too valuable as insect destroyers to be killed if the fruit can be protected in any other way. (See Biol. Surv. Bul. 30, pp. 86–92.)

RUBY-CROWNED KINGLET (Regulus calendula).

Length, about 4¼ inches. Olive green above, soiled whitish below, concealed feathers on head (crest) bright red.

Range: Breeds in southern Canada, southern Alaska, and the higher mountains of the western United States; winters in much of the United States and south to Guatemala.

Habits and economic status: In habits and haunts this tiny sprite resembles a chickadee. It is an active, nervous little creature, flitting hither and yon in search of food, and in spring stopping only long enough to utter its beautiful song, surprisingly loud for the size of the musician. Three-fourths of its food consists of wasps, bugs, and flies. Beetles are the only other item of importance (12 per cent). The bugs eaten by the kinglet are mostly small, but, happily, they are the most harmful kinds. Treehoppers, leafhoppers, and jumping plant lice are pests and often do great harm to trees and smaller plants, while plant lice and scale insects are the worst scourges of the fruit grower—in fact, the prevalence of the latter has almost risen to the magnitude of a national peril. It is these small and seemingly insignificant birds that most successfully attack and hold in check these insidious foes of horticulture. The vegetable food consists of seeds of poison ivy, or poison oak, a few weed seeds, and a few small fruits, mostly elderberries. (See Biol. Surv. Bul. 30, pp. 81–84.)

CHICKADEE (Penthestes atricapillus).

Length, about 5¼ inches.

Range: Resident in the United States (except the southern half east of the plains), Canada, and Alaska.

Habits and economic status: Because of its delightful notes, its confiding ways, and its fearlessness, the chickadee is one of our best-known birds. It responds to encouragement, and by hanging within its reach a constant supply of suet the chickadee can be made a regular visitor to the garden and orchard. Though insignificant in size, titmice are far from being so from the economic standpoint, owing to their numbers and activity. While one locality is being scrutinized for food by a larger bird, 10 are being searched by the smaller species. The chickadee's food is made up of insects and vegetable matter in the proportion of 7 of the former to 3 of the latter. Moths and caterpillars are favorites and form about one-third of the whole. Beetles, ants, wasps, bugs, flies, grasshoppers, and spiders make up the rest. The vegetable food is composed of seeds, largely those of pines, with a few of the poison ivy and some weeds. There are few more useful birds than the chickadees. (See Farmers' Bul. 54, pp. 43–44.)

WHITE-BREASTED NUTHATCH (Sitta carolinensis).

Length, 6 inches. White below, above gray, with a black head.

Range: Resident in the United States, southern Canada, and Mexico.

Habits and economic status: This bird might readily be mistaken by a careless observer for a small woodpecker, but its note, an oft-repeated *yank*, is very unwoodpecker-like, and, unlike either woodpeckers or creepers, it climbs downward as easily as upward and seems to set the laws of gravity at defiance. The name was suggested by the habit of wedging nuts, especially beechnuts, in the crevices of bark so as to break them open by blows from the sharp, strong bill. The nuthatch gets its living from the trunks and branches of trees, over which it creeps from daylight to dark. Insects and spiders constitute a little more than 50 per cent of its food. The largest items of these are beetles, moths, and caterpillars, with ants and wasps. The animal food is all in the bird's favor except a few ladybird beetles. More than half of the vegetable food consists of mast, i. e., acorns and other nuts or large seeds. One-tenth of the food is grain, mostly waste corn. The nuthatch does no injury, so far as known, and much good.

BROWN CREEPER (Certhia familiaris americana and other subspecies).

Length, 5½ inches.

Range: Breeds from Nebraska, Indiana, North Carolina (mountains), and Massachusetts north to southern Canada, also in the mountains of the western United States, north to Alaska, south to Nicaragua; winters over most of its range.

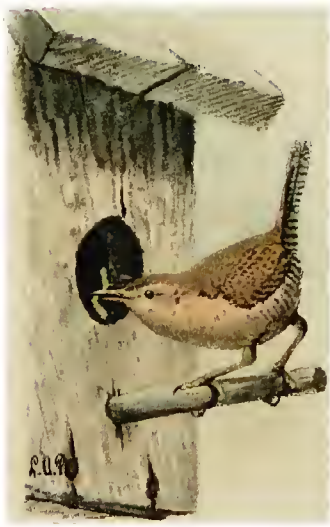
Habits and economic status: Rarely indeed is the creeper seen at rest. It appears to spend its life in an incessant scramble over the trunks and branches of trees, from which it gets all its food. It is protectively colored so as to be practically invisible to its enemies and, though delicately built, possesses amazingly strong claws and feet. Its tiny eyes are sharp enough to detect insects so small that most other species pass them by, and altogether the creeper fills a unique place in the ranks of our insect destroyers. The food consists of minute insects and insects' eggs, also cocoons of tineid moths, small wasps, ants, and bugs, especially scales and plant lice, with some small caterpillars. As the creeper remains in the United States throughout the year, it naturally secures hibernating insects and insects' eggs, as well as spiders and spiders' eggs, that are missed by the summer birds. On its bill of fare we find no product of husbandry nor any useful insects.

HOUSE WREN (Troglodytes aëdon).

Length, 4¾ inches. The only one of our wrens with wholly whitish underparts that lacks a light line over the eye.

Range: Breeds throughout the United States (except the South Atlantic and Gulf States) and southern Canada; winters in the southern United States and Mexico.

Habits and economic status: The rich, bubbling song of the familiar little house wren is one of the sweetest associations connected with country and suburban life. Its tiny body, long bill, sharp eyes, and strong feet peculiarly adapt it for creeping into all sorts of nooks and crannies where lurk the insects it feeds on. A cavity in a fence post, a hole in a tree, or a box will be welcomed alike by this busybody as a nesting site; but since the advent of the quarrelsome English sparrow such domiciles are at a premium and the wren's eggs and family are safe only in cavities having entrances too small to admit the sparrow. Hence it behooves the farmer's boy to provide boxes the entrances to which are about an inch in diameter, nailing these under gables of barns and outhouses or in orchard trees. In this way the numbers of this useful bird can be increased, greatly to the advantage of the farmer. Grasshoppers, beetles, caterpillars, bugs, and spiders are the principal elements of its food. Cutworms, weevils, ticks, and plant lice are among the injurious forms eaten. The nestlings of house wrens consume great quantities of insects. (See Yearbook U. S. Dept. Agric. 1895, pp. 416–418, and Biol. Survey Bul. 30, pp. 60–62.)



BROWN THRASHER (Toxostoma rufum).

Length, about 11 inches. Brownish red above, heavily streaked with black below.

Range: Breeds from the Gulf States to southern Canada and west to Colorado, Wyoming, and Montana; winters in the southern half of the eastern United States.

Habits and economic status: The brown thrasher is more retiring than either the mocking bird or catbird, but like them is a splendid singer. Not infrequently, indeed, its song is taken for that of its more famed cousin, the mocking bird. It is partial to thickets and gets much of its food from the ground. Its search for this is usually accompanied by much scratching and scattering of leaves; whence its common name. Its call note is a sharp sound like the smacking of lips, which is useful in identifying this long-tailed, thicket-haunting bird, which does not much relish close scrutiny. The brown thrasher is not so fond of fruit as the catbird and mocker, but devours a much larger percentage of animal food. Beetles form one-half of the animal food, grasshoppers and crickets one-fifth, caterpillars, including cutworms, somewhat less than one-fifth, and bugs, spiders, and millipeds comprise most of the remainder. The brown thrasher feeds on such coleopterous pests as wireworms, May beetles, rice weevils, rose beetles, and figeaters. By its destruction of these and other insects, which constitute more than 60 per cent of its food, the thrasher much more than compensates for that portion (about one-tenth) of its diet derived from cultivated crops. (See Yearbook U. S. Dept. Agric. 1895, pp. 411–415.)

CATBIRD (Dumetella carolinensis).

Length, about 9 inches. The slaty gray plumage and black cap and tail are distinctive.

Range: Breeds throughout the United States west to New Mexico, Utah, Oregon, and Washington, and in southern Canada; winters from the Gulf States to Panama.

Habits and economic status: In many localities the catbird is one of the commonest birds. Tangled growths are its favorite nesting places and retreats, but berry patches and ornamental shrubbery are not disdained. Hence the bird is a familiar dooryard visitor. The bird has a fine song, unfortunately marred by occasional cat calls. With habits similar to those of the mocking bird and a song almost as varied, the catbird has never secured a similar place in popular favor. Half of its food consists of fruit, and the cultivated crops most often injured are cherries, strawberries, raspberries, and blackberries. Beetles, ants, crickets, and grasshoppers are the most important element of its animal food. The bird is known to attack a few pests, as cutworms, leaf beetles, clover-root curculio, and the periodical cicada, but the good it does in this way probably does not pay for the fruit it steals. The extent to which it should be protected may perhaps be left to the individual cultivator; that is, it should be made lawful to destroy catbirds that are doing manifest damage to crops. (See Yearbook U. S. Dept. Agric. 1895, pp. 406–411.)

MOCKING BIRD (Mimus polyglottos).

Length, 10 inches. Most easily distinguished from the similarly colored loggerhead shrike (see p. 679) by the absence of a conspicuous black stripe through the eye.

Range: Resident from southern Mexico north to California, Wyoming, Iowa, Ohio, and Maryland; casual farther north.

Habits and economic status: Because of its incomparable medleys and imitative powers, the mocking bird is the most renowned singer of the Western Hemisphere. Even in confinement it is a masterly performer, and formerly thousands were trapped and sold for cage birds, but this reprehensible practice has been largely stopped by protective laws. It is not surprising, therefore, that the mocking bird should receive protection principally because of its ability as a songster and its preference for the vicinity of dwellings. Its place in the affections of the South is similar to that occupied by the robin in the North. It is well that this is true, for the bird appears not to earn protection from a strictly economic standpoint. About half of its diet consists of fruit, and many cultivated varieties are attacked, such as oranges, grapes, figs, strawberries, blackberries, and raspberries. Somewhat less than a fourth of the food is animal matter, and grasshoppers are the largest single element. The bird is fond of cotton worms, and is known to feed also on the chinch bug, rice weevil, and bollworm. It is unfortunate that it does not feed on injurious insects to an extent sufficient to offset its depredations on fruit. (See Yearbook U. S. Dept. Agric. 1895, pp. 415–416, and Biol. Survey Bul. 30, pp. 52–56.)

MYRTLE WARBLER (Dendroica coronata).

Length, 5½ inches. The similarly colored Audubon's warbler has a yellow throat instead of a white one.

Range: Breeds throughout most of the forested area of Canada and south to Minnesota, Michigan, New York, and Massachusetts; winters in the southern two-thirds of the United States and south to Panama.

Habits and economic status: This member of our beautiful wood warbler family, a family peculiar to America, has the characteristic voice, coloration, and habits of its kind. Trim of form and graceful of motion, when seeking food it combines the methods of the wrens, creepers, and flycatchers. It breeds only in the northern parts of the eastern United States, but in migration it occurs in every patch of woodland and is so numerous that it is familiar to every observer. Its place is taken in the West by Audubon's warbler. More than three-fourths of the food of the myrtle warbler consists of insects, practically all of them harmful. It is made up of small beetles, including some weevils, with many ants and wasps. This bird is so small and nimble that it successfully attacks insects too minute to be prey for larger birds. Scales and plant lice form a very considerable part of its diet. Flies are the largest item of food; in fact, only a few flycatchers and swallows eat as many flies as this bird. The vegetable food (22 per cent) is made up of fruit and the seeds of poison oak or ivy, also the seeds of pine and of the bayberry.

LOGGERHEAD SHRIKE (Lanius ludovicianus).

Length, about 9 inches. A gray, black, and white bird, distinguished from the somewhat similarly colored mocking bird by the black stripe on side of head.

Range: Breeds throughout the United States, Mexico, and southern Canada; winters in the southern half of the United States and in Mexico.

Habits and economic status: The loggerhead shrike, or southern butcher bird, is common throughout its range and is sometimes called "French mocking bird" from a superficial resemblance and not from its notes, which are harsh and unmusical. The shrike is naturally an insectivorous bird which has extended its bill of fare to include small mammals, birds, and reptiles. Its hooked beak is well adapted to tearing its prey, while to make amends for the lack of talons it has hit upon the plan of forcing its victim, if too large to swallow, into the fork of a bush or tree, where it can tear it asunder. Insects, especially grasshoppers, constitute the larger part of its food, though beetles, moths, caterpillars, ants, wasps, and a few spiders also are taken. While the butcher bird occasionally catches small birds, its principal vertebrate food is small mammals, as field mice, shrews, and moles, and when possible it obtains lizards. It habitually impales its surplus prey on a thorn, sharp twig, or barb of a wire fence. (See Biol. Survey Bul. 9, pp. 20–24, and Bul. 30, pp. 33–38.)

BARN SWALLOW (Hirundo erythrogastra).

Length, about 7 inches. Distinguished among our swallows by deeply forked tail.

Range: Breeds throughout the United States (except the South Atlantic and Gulf States) and most of Canada; winters in South America.

Habits and economic status: This is one of the most familiar birds of the farm and one of the greatest insect destroyers. From daylight to dark on tireless wings it seeks its prey, and the insects destroyed are countless. Its favorite nesting site is a barn rafter, upon which it sticks its mud basket. Most modern barns are so tightly constructed that swallows can not gain entrance, and in New England and some other parts of the country barn swallows are much less numerous than formerly. Farmers can easily provide for the entrance and exit of the birds and so add materially to their numbers. It may be well to add that the parasites that sometimes infest the nests of swallows are not the ones the careful housewife dreads, and no fear need be felt of the infestation spreading to the houses. Insects taken on the wing constitute the almost exclusive diet of the barn swallow. More than one-third of the whole consists of flies, including unfortunately some useful parasitic species. Beetles stand next in order and consist of a few weevils and many of the small dung beetles of the May beetle family that swarm over the pastures in the late afternoon. Ants amount to more than one-fifth of the whole food, while wasps and bees are well represented.

PURPLE MARTIN (Progne subis).

Length, about 8 inches.

Range: Breeds throughout the United States and southern Canada, south to central Mexico; winters in South America.

Habits and economic status: This is the largest as it is one of the most beautiful of the swallow tribe. It formerly built its nests in cavities of trees, as it still does in wild districts, but learning that man was a friend it soon adopted domestic habits. Its presence about the farm can often be secured by erecting houses suitable for nesting sites and protecting them from usurpation by the English sparrow, and every effort should be made to increase the number of colonies of this very useful bird. The boxes should be at a reasonable height, say 15 feet from the ground, and made inaccessible to cats. A colony of these birds on a farm makes great inroads upon the insect population, as the birds not only themselves feed upon insects but rear their young upon the same diet. Fifty years ago in New England it was not uncommon to see colonies of 50 pairs of martins, but most of them have now vanished for no apparent reason except that the martin houses have decayed and have not been renewed. More than three-fourths of this bird's food consists of wasps, bugs, and beetles, their importance being in the order given. The beetles include several species of harmful weevils, as the clover-leaf weevils and the nut weevils. Besides these are many crane flies, moths, May flies, and dragonflies.

BLACK-HEADED GROSBEAK (Zamelodia melanocephala).

Length, about 8¼ inches.

Range: Breeds from the Pacific coast to Nebraska and the Dakotas, and from southern Canada to southern Mexico; winters in Mexico.

Habits and economic status: The black-headed grosbeak takes the place in the West of the rosebreast in the East, and like it is a fine songster. Like it also the blackhead readily resorts to orchards and gardens and is common in agricultural districts. The bird has a very powerful bill and easily crushes or cuts into the firmest fruit. It feeds upon cherries, apricots, and other fruits, and also does some damage to green peas and beans, but it is so active a foe of certain horticultural pests that we can afford to overlook its faults. Several kinds of scale insects are freely eaten, and one, the black olive scale, constitutes a fifth of the total food. In May many cankerworms and codling moths are consumed, and almost a sixth of the bird's seasonal food consists of flower beetles, which do incalculable damage to cultivated flowers and to ripe fruit. For each quart of fruit consumed by the black-headed grosbeak it destroys in actual bulk more than 1½ quarts of black olive scales and 1 quart of flower beetles, besides a generous quantity of codling-moth pupæ and cankerworms. It is obvious that such work as this pays many times over for the fruit destroyed. (See Biol. Survey Bul. 32, pp. 60–77.)

ROSE-BREASTED GROSBEAK (Zamelodia ludoviciana).

Length, 8 inches.

Range: Breeds from Kansas, Ohio, Georgia (mountains), and New Jersey, north to southern Canada; winters from Mexico to South America.

Habits and economic status: This beautiful grosbeak is noted for its clear, melodious notes, which are poured forth in generous measure. The rosebreast sings even at midday during summer, when the intense heat has silenced almost every other songster. Its beautiful plumage and sweet song are not its sole claim on our favor, for few birds are more beneficial to agriculture. The rosebreast eats some green peas and does some damage to fruit. But this mischief is much more than balanced by the destruction of insect pests. The bird is so fond of the Colorado potato beetle that it has earned the name of "potato-bug bird," and no less than a tenth of the total food of the rosebreasts examined consists of potato beetles—evidence that the bird is one of the most important enemies of the pest. It vigorously attacks cucumber beetles and many of the scale insects. It proved an active enemy of the Rocky Mountain locust during that insect's ruinous invasions, and among the other pests it consumes are the spring and fall cankerworms, orchard and forest tent caterpillars, tussock, gipsy, and brown-tail moths, plum curculio, army worm, and chinch bug. In fact, not one of our birds has a better record. (See Biol. Survey Bul. 32, pp. 33–59.)

SONG SPARROW (Melospiza melodia).

Length, about 6¼ inches. The heavily spotted breast with heavy central blotch is characteristic.

Range: Breeds in the United States (except the South Atlantic and Gulf States), southern Canada, southern Alaska, and Mexico; winters in Alaska and most of the United States southward.

Habits and economic status: Like the familiar little "chippy," the song sparrow is one of our most domestic species, and builds its nest in hedges or in garden shrubbery close to houses, whenever it is reasonably safe from the house cat, which, however, takes heavy toll of the nestlings. It is a true harbinger of spring, and its delightful little song is trilled forth from the top of some green shrub in early March and April, before most of our other songsters have thought of leaving the sunny south. Song sparrows vary much in habits, as well as in size and coloration. Some forms live along streams bordered by deserts, others in swamps among bulrushes and tules, others in timbered regions, others on rocky barren hillsides, and still others in rich, fertile valleys. With such a variety of habitat, the food of the species naturally varies considerably. About three-fourths of its diet consists of the seeds of noxious weeds and one-fourth of insects. Of these, beetles, especially weevils, constitute the major portion. Ants, wasps, bugs (including the black olive scale), and caterpillars are also eaten. Grasshoppers are taken by the eastern birds, but not by the western ones. (See Biol. Survey Bul. 15, pp. 82–86.)

CHIPPING SPARROW (Spizella passerina).

Length, about 5¼ inches. Distinguished by the chestnut crown, black line through eye, and black bill.

Range: Breeds throughout the United States, south to Nicaragua, and north to southern Canada; winters in the southern United States and southward.

Habits and economic status: The chipping sparrow is very friendly and domestic, and often builds its nest in gardens and orchards or in the shrubbery close to dwellings. Its gentle and confiding ways endear it to all bird lovers. It is one of the most insectivorous of all the sparrows. Its diet consists of about 42 per cent of insects and spiders and 58 per cent of vegetable matter. The animal food consists largely of caterpillars, of which it feeds a great many to its young. Besides these, it eats beetles, including many weevils, of which one stomach contained 30. It also eats ants, wasps, and bugs. Among the latter are plant lice and black olive scales. The vegetable food is practically all weed seed. A nest with 4 young of this species was watched at different hours on 4 days. In the 7 hours of observation 119 feedings were noted, or an average of 17 feedings per hour, or 4¼ feedings per hour to each nestling. This would give for a day of 14 hours at least 238 insects eaten by the brood. (See Biol. Survey Bul. 15, pp. 76–78.)

WHITE-CROWNED SPARROW (Zonotrichia leucophrys).

Length, 7 inches. The only similar sparrow, the white-throat, has a yellow spot in front of eye.

Range: Breeds in Canada, the mountains of New Mexico, Colorado, Wyoming, and Montana, and thence to the Pacific coast; winters in the southern half of the United States and in northern Mexico.

Habits and economic status: This beautiful sparrow is much more numerous in the western than in the eastern States, where, indeed, it is rather rare. In the East it is shy and retiring, but it is much bolder and more conspicuous in the far West and there often frequents gardens and parks. Like most of its family it is a seed eater by preference, and insects comprise very little more than 7 per cent of its diet. Caterpillars are the largest item, with some beetles, a few ants and wasps, and some bugs, among which are black olive scales. The great bulk of the food, however, consists of weed seeds, which amount to 74 per cent of the whole. In California this bird is accused of eating the buds and blossoms of fruit trees, but buds or blossoms were found in only 30 out of 516 stomachs, and probably it is only under exceptional circumstances that it does any damage in this way. Evidently neither the farmer nor the fruit grower has much to fear from the white-crowned sparrow. The little fruit it eats is mostly wild, and the grain eaten is waste or volunteer. (See Biol. Survey Bul. 34, pp. 75–77.)

ENGLISH SPARROW (Passer domesticus).

Length, about 6¼ inches. Its incessant chattering, quarrelsome disposition, and abundance and familiarity about human habitations distinguish it from our native sparrows.

Range: Resident throughout the United States and southern Canada.

Habits and economic status: Almost universally condemned since its introduction into the United States, the English sparrow has not only held its own, but has ever increased in numbers and extended its range in spite of all opposition. Its habit of driving out or even killing more beneficial species and the defiling of buildings by its droppings and by its own unsightly structures, are serious objections to this sparrow. Moreover, in rural districts, it is destructive to grain, fruit, peas, beans, and other vegetables. On the other hand, the bird feeds to some extent on a large number of insect pests, and this fact points to the need of a new investigation of the present economic status of the species, especially as it promises to be of service in holding in check the newly introduced alfalfa weevil, which threatens the alfalfa industry in Utah and neighboring States. In cities most of the food of the English sparrow is waste material secured from the streets.

CROW BLACKBIRD (Quiscalus quiscula).

Length, 12 inches. Shorter by at least 3 inches than the other grackles with trough-shaped tails. Black, with purplish, bluish, and bronze reflections.

Range: Breeds throughout the United States west to Texas, Colorado, and Montana, and in southern Canada; winters in the southern half of the breeding range.

Habits and economic status: This blackbird is a beautiful species, and is well known from its habit of congregating in city parks and nesting there year after year. Like other species which habitually assemble in great flocks, it is capable of inflicting much damage on any crop it attacks, and where it is harmful a judicious reduction of numbers is probably sound policy.

It shares with the crow and blue jay the evil habit of pillaging the nests of small birds of eggs and young. Nevertheless it does much good by destroying insect pests, especially white grubs, weevils, grasshoppers, and caterpillars. Among the caterpillars are army worms and other cutworms. When blackbirds gather in large flocks, as in the Mississippi Valley, they may greatly damage grain, either when first sown or when in the milk. In winter they subsist mostly on weed seed and waste grain. (See Biol. Surv. Bul. 13, pp. 53–70.)

BREWER'S BLACKBIRD (Euphagus cyanocephalus).

Length, 10 inches. Its glossy purplish head distinguishes it from other blackbirds that do not show in flight a trough-shaped tail.

Range: Breeds in the West, east to Texas, Kansas, and Minnesota, and north to southern Canada; winters over most of the United States breeding range, south to Guatemala.

Habits and economic status: Very numerous in the West and in fall gathers in immense flocks, especially about barnyards and corrals. During the cherry season in California Brewer's blackbird is much in the orchards. In one case they were seen to eat freely of cherries, but when a neighboring fruit raiser began to plow his orchard almost every blackbird in the vicinity was upon the newly opened ground and close at the plowman's heels in its eagerness to get the insects exposed by the plow. Caterpillars and pupæ form the largest item of animal food (about 12 per cent). Many of these are cutworms, and cotton bollworms or corn earworms were found in 10 stomachs and codling-moth pupæ in 11. Beetles constitute over 11 per cent of the food. The vegetable food is practically contained in three items—grain, fruit, and weed seeds. Grain, mostly oats, amounts to 54 per cent; fruit, largely cherries, 4 per cent; and weed seeds, not quite 9 per cent. The grain is probably mostly wild, volunteer, or waste, so that the bird does most damage by eating fruit. (See Biol. Surv. Bul. 34, pp. 59–65.)

BULLOCK'S ORIOLE (Icterus bullocki).

Length, about 8 inches. Our only oriole with top of head and throat black and cheeks orange.

Range: Breeds from South Dakota, Nebraska, and Kansas to the Pacific Ocean and from southern Canada to northern Mexico; winters in Mexico.

Habits and economic status: In the West this bird takes the place occupied in the East by the Baltimore oriole. In food, nesting habits, and song the birds are similar. Both are migratory and remain on their summer range only some five or six months. They take kindly to orchards, gardens, and the vicinity of farm buildings and often live in villages and city parks. Their diet is largely made up of insects that infest orchards and gardens. When fruit trees are in bloom they are constantly busy among the blossoms and save many of them from destruction. In the food of Bullock's oriole beetles amount to 35 per cent and nearly all are harmful. Many of these are weevils, some of which live upon acorns and other nuts. Ants and wasps amount to 15 per cent of the diet. The black olive scale was found in 45 of the 162 stomachs examined. Caterpillars, with a few moths and pupæ, are the largest item of food and amount to over 41 per cent. Among these were codling-moth larvæ. The vegetable food is practically all fruit (19 per cent) and in cherry season consists largely of that fruit. Eating small fruits is the bird's worst trait, but it will do harm in this way only when very numerous. (See Biol. Surv. Bul. 34, pp. 68–71.)

MEADOWLARKS (Sturnella magna and Sturnella neglecta).

Length, about 10¼ inches.

Range: Breed generally in the United States, southern Canada, and Mexico to Costa Rica; winter from the Ohio and Potomac Valleys and British Columbia southward.

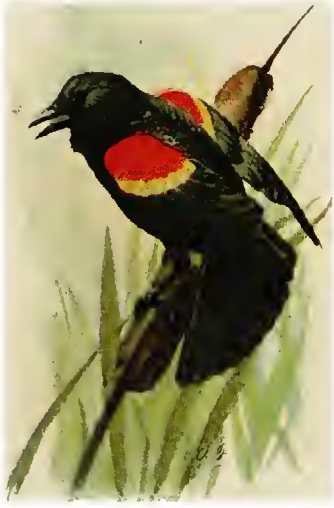
Habits and economic status: Our two meadowlarks, though differing much in song, resemble each other closely in plumage and habits. Grassy plains and uplands covered with a thick growth of grass or weeds, with near-by water, furnish the conditions best suited to the meadowlark's taste. The song of the western bird is loud, clear, and melodious. That of its eastern relative is feebler and loses much by comparison. In many localities the meadowlark is classed and shot as a game bird. From the farmer's standpoint this is a mistake, since its value as an insect eater is far greater than as an object of pursuit by the sportsman. Both the boll weevil, the foe of the cotton grower, and the alfalfa weevil are among the beetles it habitually eats. Twenty-five per cent of the diet of this bird is beetles, half of which are predaceous ground beetles, accounted useful insects, and one-fifth are destructive weevils. Caterpillars form 11 per cent of the food and are eaten in every month in the year. Among these are many cutworms and the well-known army worm. Grasshoppers are favorite food and are eaten in every month and almost every day. The vegetable food (24 per cent of the whole) consists of grain and weed seeds. (See Yearbook U. S. Dept. Agr. 1895, pp. 420–426.)

RED-WINGED BLACKBIRD (Agelaius phœniceus).

Length, about 9½ inches.

Range: Breeds in Mexico and North America south of the Barren Grounds; winters in southern half of United States and south to Costa Rica.

Habits and economic status: The prairies of the upper Mississippi Valley, with their numerous sloughs and ponds, furnish ideal nesting places for redwings, and consequently this region has become the great breeding ground for the species. These prairies pour forth the vast flocks that play havoc with grainfields. East of the Appalachian Range, marshes on the shores of lakes, rivers, and estuaries are the only available breeding sites and, as these are comparatively few and small, the species is much less abundant than in the West. Redwings are eminently gregarious, living in flocks and breeding in communities. The food of the redwing consists of 27 per cent animal matter and 73 per cent vegetable. Insects constitute practically one-fourth of the food. Beetles (largely weevils, a most harmful group) amount to 10 per cent. Grasshoppers are eaten in every month and amount to about 5 per cent. Caterpillars (among them the injurious army worm) are eaten at all seasons and aggregate 6 per cent. Ants, wasps, bugs, flies, dragonflies, and spiders also are eaten. The vegetable food consists of seeds, including grain, of which oats is the favorite, and some small fruits. When in large flocks this bird is capable of doing great harm to grain. (See Biol. Survey Bul. 13, pp. 33–34.)



BOBOLINK (Dolichonyx oryzivorus).

Length, about 7 inches.

Range: Breeds from Ohio northeast to Nova Scotia, north to Manitoba, and northwest to British Columbia; winters in South America.

Habits and economic status: When American writers awoke to the beauty and attractiveness of our native birds, among the first to be enshrined in song and story was the bobolink. Few species show such striking contrasts in the color of the sexes, and few have songs more unique and whimsical. In its northern home the bird is loved for its beauty and its rich melody; in the South it earns deserved hatred by its destructiveness. Bobolinks reach the southeastern coast of the United States the last half of April just as rice is sprouting and at once begin to pull up and devour the sprouting kernels. Soon they move on to their northern breeding grounds, where they feed upon insects, weed seeds, and a little grain. When the young are well on the wing, they gather in flocks with the parent birds and gradually move southward, being then generally known as reed birds. They reach the rice fields of the Carolinas about August 20, when the rice is in the milk. Then until the birds depart for South America planters and birds fight for the crop, and in spite of constant watchfulness and innumerable devices for scaring the birds a loss of 10 per cent of the rice is the usual result. (See Biol. Survey Bul. 13, pp. 12–22.)

COMMON CROW (Corvus brachyrhynchos).

Length, 19 inches.

Range: Breeds throughout the United States and most of Canada; winters generally in the United States.

Habits and economic status: The general habits of the crow are universally known. Its ability to commit such misdeeds as pulling corn and stealing eggs and fruit and to get away unscathed is little short of marvelous. Much of the crow's success in life is due to cooperation, and the social instinct of the species has its highest expression in the winter roosts, which are sometimes frequented by hundreds of thousands of crows. From these roosts daily flights of many miles are made in search of food. Injury to sprouting corn is the most frequent complaint against this species, but by coating the seed grain with coal tar most of this damage may be prevented. Losses of poultry and eggs may be averted by proper housing and the judicious use of wire netting. The insect food of the crow includes wireworms, cutworms, white grubs, and grasshoppers, and during outbreaks of these insects the crow renders good service. The bird is also an efficient scavenger. But chiefly because of its destruction of beneficial wild birds and their eggs the crow must be classed as a criminal, and a reduction in its numbers in localities where it is seriously destructive is justifiable. (See Farmers' Bul. 54, pp. 22–23.)

CALIFORNIA JAY (**Aphelocoma californica**).

Length, 12 inches. Distinguished from other jays within its range by its decidedly whitish underparts and brown patch on the back.

Range: Resident in California, north to southern Washington, and south to southern Lower California.

Habits and economic status: This jay has the same general traits of character as the eastern blue jay. He is the same noisy, rollicking fellow and occupies a corresponding position in bird society. Robbing the nests of smaller birds is a favorite pastime, and he is a persistent spy upon domestic fowls and well knows the meaning of the cackle of a hen. Not only does he steal eggs but he kills young chicks. The insect food of this jay constitutes about one-tenth of its annual sustenance. The inclusion of grasshoppers and caterpillars makes this part of the bird's food in its favor. But the remainder of its animal diet includes altogether too large a proportion of beneficial birds and their eggs, and in this respect it appears to be worse than its eastern relative, the blue jay. While its vegetable food is composed largely of mast, at times its liking for cultivated fruit and grain makes it a most unwelcome visitor to the orchard and farm. In conclusion it may be said that over much of its range this jay is too abundant for the best interests of agriculture and horticulture. (See Biol. Survey Bul. 34, pp. 50–56.)

BLUE JAY (**Cyanocitta cristata**).

Length, 11½ inches. The brilliant blue of the wings and tail combined with the black crescent of the upper breast and the crested head distinguish this species.

Range: Resident in the eastern United States and southern Canada, west to the Dakotas, Colorado, and Texas.

Habits and economic status: The blue jay is of a dual nature. Cautious and silent in the vicinity of its nest, away from it it is bold and noisy. Sly in the commission of mischief, it is ever ready to scream "thief" at the slightest disturbance. As usual in such cases, its remarks are applicable to none more than itself, a fact neighboring nest holders know to their sorrow, for during the breeding season the jay lays heavy toll upon the eggs and young of other birds, and in doing so deprives us of the services of species more beneficial than itself. Approximately three-fourths of the annual food of the blue jay is vegetable matter, the greater part of which is composed of mast, i. e., acorns, chestnuts, beechnuts, and the like. Corn is the principal cultivated crop upon which this bird feeds, but stomach analysis indicates that most of the corn taken is waste grain. Such noxious insects as wood-boring beetles, grasshoppers, eggs of various caterpillars, and scale insects constitute about one-fifth of its food. (See Farmers' Bul. 54, pp. 18–19.)

HORNED LARK (Otocoris alpestris).

Length, about 7¾ inches. The black mark across the breast and the small, pointed tufts of dark feathers above and behind the eyes distinguish the bird.

Range: Breeds throughout the United States (except the South Atlantic and Gulf States) and Canada; winters in all the United States except Florida.

Habits and economic status: Horned larks frequent the open country, especially the plains and deserts. They associate in large flocks, are hardy, apparently delighting in exposed situations in winter, and often nest before snow disappears. The flight is irregular and hesitating, but in the breeding season the males ascend high in air, singing as they go, and pitch to the ground in one thrilling dive. The preference of horned larks is for vegetable food, and about one-sixth of this is grain, chiefly waste. Some sprouting grain is pulled, but drilled grain is safe from injury. California horned larks take much more grain than the eastern birds, specializing on oats, but this is accounted for by the fact that oats grow wild over much of the State. Weed seeds are the largest single element of food. The insect food, about 20 per cent of the whole, includes such pests as May beetles and their larvæ (white grubs), leaf beetles, clover-leaf and clover-root weevils, the potato-stalk borer, nut weevils, billbugs, and the chinch bug. Grasshoppers are a favorite food, and cutworms are freely eaten. The horned larks, on the whole, may be considered useful birds. (See Biol. Survey Bul. 23.)

ARKANSAS KINGBIRD (Tyrannus verticalis).

Length, 9 inches. The white edge of the feather on each side of the tail distinguishes this from all other flycatchers except the gray and salmon-colored scissortail of Texas.

Range: Breeds from Minnesota, Kansas, and Texas to the Pacific Ocean and from northern Mexico to southern Canada; winters from Mexico to Guatemala.

Habits and economic status: The Arkansas kingbird is not so domestic as its eastern relative and seems to prefer the hill country with scattered oaks rather than the orchard or the vicinity of ranch buildings, but it sometimes places its rude and conspicuous nest in trees on village streets. The bird's yearly food is composed of 87 per cent animal matter and 13 per cent vegetable. The animal food is composed almost entirely of insects. Like the eastern species, it has been accused of destroying honeybees to a harmful extent, and remains of honeybees were found to constitute 5 per cent of the food of the individuals examined, but nearly all those eaten were drones. Bees and wasps, in general, are the biggest item of food (38 per cent), grasshoppers and crickets stand next (20 per cent), and beetles, mostly of noxious species, constitute 14 per cent of the food. The vegetable food consists mostly of fruit, such as the elder and other berries, with a few seeds. This bird should be strictly preserved. (See Biol. Survey Bul. 34, pp. 32–34, and Bul. 44, pp. 19–22.)

KINGBIRD (Tyrannus tyrannus).

Length, about 8½ inches. The white lower surface and white-tipped tail distinguish this flycatcher.

Range: Breeds throughout the United States (except the southwestern part) and southern Canada; winters from Mexico to South America.

Habits and economic status: The kingbird is a pronounced enemy of hawks and crows, which it vigorously attacks at every opportunity, thereby affording efficient protection to near-by poultry yards and young chickens at large. It loves the open country and is especially fond of orchards and trees about farm buildings. No less than 85 per cent of its food consists of insects, mostly of a harmful nature. It eats the common rose chafer or rose bug, and more remarkable still it devours blister beetles freely. The bird has been accused of eating boneybees to an injurious extent, but there is little ground for the accusation, as appears from the fact that examination of 634 stomachs showed only 61 bees in 22 stomachs. Of these 51 were useless drones. On the other hand, it devours robber flies, which catch and destroy honeybees. Grasshoppers and crickets, with a few bugs and some cutworms, and a few other insects, make up the rest of the animal food. The vegetable food consists of fruit and a few seeds. The kingbird deserves full protection. (See Biol. Surv. Bul. 44, pp. 11–19.)

NIGHTHAWK (Chordeiles virginianus).

Length, 10 inches. Not to be confused with the whippoorwill. The latter lives in woodland and is chiefly nocturnal. The nighthawk often flies by day, when the white bar across the wing and its nasal cry are distinguishing.

Range: Breeds throughout most of the United States and Canada; winters in South America.

Habits and economic status: The skillful evolutions of a company of nighthawks as the birds gracefully cleave the air in intersecting circles is a sight to be remembered. So expert are they on the wing that no insect is safe from them, even the swift dragonfly being captured with ease. Unfortunately their erratic flight tempts men to use them for targets, and this inexcusable practice is seriously diminishing their numbers, which is deplorable, since no birds are more useful. This species makes no nest, but lays its two spotted eggs on the bare ground, sometimes on the gravel roof of the city house. The nighthawk is a voracious feeder and is almost exclusively insectivorous. Some stomachs contained from 30 to 50 different kinds of insects, and more than 600 kinds have been identified from the stomachs thus far examined. From 500 to 1,000 ants are often found in a stomach. Several species of mosquitoes, including *Anopheles*, the transmitter of malaria, are eaten. Other well-known pests destroyed by the nighthawk are the Colorado potato beetle, cucumber beetles, chestnut, rice, clover-leaf and cotton-boll weevils, billbugs, bark beetles, squash bugs, and moths of the cotton worm.

FLICKER (Colaptes auratus).

Length, 13 inches. The yellow under surface of the wing, yellow tail shafts, and white rump are characteristic.

Range: Breeds in the eastern United States west to the plains and in the forested parts of Canada and Alaska; winters in most of the eastern United States.

Habits and economic status: The flicker inhabits the open country rather than the forest and delights in park-like regions where trees are numerous and scattered. It nests in any large cavity in a tree and readily appropriates an artificial box. It is possible, therefore, to insure the presence of this useful bird about the farm and to increase its numbers. It is the most terrestrial of our woodpeckers and procures much of its food from the ground. The largest item of animal food is ants, of which the flicker eats more than any other common bird. Ants were found in 524 of the 684 stomachs examined and 98 stomachs contained no other food. One stomach contained over 5,000 and two others held over 3,000 each. While bugs are not largely eaten by the flicker, one stomach contained 17 chinch bugs. Wild fruits are next to ants in importance in the flicker's dietary. Of these sour gum and wild black cherry stand at the head. The food habits of this bird are such as to recommend it to complete protection. (See Biol. Survey Bul. 37, pp. 52–58.)

YELLOW-BELLIED SAPSUCKER (Sphyrapicus varius).

Length, about 8½ inches. Only woodpecker having top of head from base of bill red, combined with a black patch on breast.

Range: Breeds in northern half of the United States and southern half of Canada; winters in most of the States and south to Costa Rica.

Habits and economic status: The yellow-bellied sapsucker is rather silent and suspicious and generally manages to have a tree between himself and the observer. Hence the bird is much better known by its works than its appearance. The regular girdles of holes made by this bird are common on a great variety of trees; in all about 250 kinds are known to be attacked. Occasionally young trees are killed outright, but more loss is caused by stains and other blemishes in the wood which result from sapsucker punctures. These blemishes, which are known as bird pecks, are especially numerous in hickory, oak, cypress, and yellow poplar. Defects due to sapsucker work cause an annual loss to the lumber industry estimated at $1,250,000. The food of the yellow-bellied sapsucker is about half animal and half vegetable. Its fondness for ants counts slightly in its favor. It eats also wasps, beetles (including, however, very few wood-boring species), bugs, and spiders. The two principal components of the vegetable food are wild fruits of no importance and cambium (the layer just beneath the bark of trees). In securing the cambium the bird does the damage above described. The yellow-bellied sapsucker, unlike other woodpeckers, thus does comparatively little good and much harm. (See Biol. Survey Bul. 39.)

DOWNY WOODPECKER (Dryobates pubescens).

Length, 6 inches. Our smallest woodpecker; spotted with black and white. Dark bars on the outer tail feathers distinguish it from the similarly colored but larger hairy woodpecker.

Range: Resident in the United States and the forested parts of Canada and Alaska.

Habits and economic status: This woodpecker is commonly distributed, living in woodland tracts, orchards, and gardens. The bird has several characteristic notes, and, like the hairy woodpecker, is fond of beating on a dry resonant tree branch a tattoo which to appreciative ears has the quality of woodland music. In a hole excavated in a dead branch the downy woodpecker lays four to six eggs. This and the hairy woodpecker are among our most valuable allies, their food consisting of some of the worst foes of orchard and woodland, which the woodpeckers are especially equipped to dig out of dead and living wood. In the examination of 723 stomachs of this bird, animal food, mostly insects, was found to constitute 76 per cent of the diet and vegetable matter 24 per cent. The animal food consists largely of beetles that bore into timber or burrow under the bark. Caterpillars amount to 16 per cent of the food and include many especially harmful species. Grasshopper eggs are freely eaten. The vegetable food of the downy woodpecker consists of small fruit and seeds, mostly of wild species. It distributes seeds of poison ivy, or poison oak, which is about the only fault of this very useful bird. (See Biol. Survey Bul. 37, pp. 17–22.)

YELLOW-BILLED CUCKOO (Coccyzus americanus).

Length, about 12 inches. The yellow lower part of the bill distinguishes this bird from its near relative, the black-billed cuckoo.

Range: Breeds generally in the United States and southern Canada; winters in South America.

Habits and economic status: This bird lives on the edges of woodland, in groves, orchards, parks, and even in shaded village streets. It is sometimes known as rain crow, because its very characteristic notes are supposed to foretell rain. The cuckoo has sly, furtive ways as it moves among the bushes or flits from tree to tree, and is much more often seen than heard. Unlike its European relative, it does not lay its eggs in other birds' nests, but builds a nest of its own. This is, however, a rather crude and shabby affair—hardly more than a platform of twigs sufficient to hold the greenish eggs. The cuckoo is extremely useful because of its insectivorous habits, especially as it shows a marked preference for the hairy caterpillars, which few birds eat. One stomach that was examined contained 250 American tent caterpillars; another, 217 fall webworms. In places where tent caterpillars are abundant they seem to constitute a large portion of the food of this and the black-billed cuckoo.

SCREECH OWL (Otus asio).

Length, about 8 inches. Our smallest owl with ear tufts. There are two distinct phases of plumage, one grayish and the other bright rufous.

Range: Resident throughout the United States, southern Canada, and northern Mexico.

Habits and economic status: The little screech owl inhabits orchards, groves, and thickets, and hunts for its prey in such places as well as along hedgerows and in the open. During warm spells in winter it forages quite extensively and stores up in some hollow tree considerable quantities of food for use during inclement weather. Such larders frequently contain enough mice or other prey to bridge over a period of a week or more. With the exception of the burrowing owl it is probably the most insectivorous of the nocturnal birds of prey. It feeds also upon small mammals, birds, reptiles, batrachians, fish, spiders, crawfish, scorpions, and earthworms. Grasshoppers, crickets, ground-dwelling beetles, and caterpillars are its favorites among insects, as are field mice among mammals and sparrows among birds. Out of 324 stomachs examined, 169 were found to contain insects; 142, small mammals; 56, birds; and 15, crawfish. The screech owl should be encouraged to stay near barns and outhouses, as it will keep in check house mice and wood mice, which frequent such places. (See Biol. Survey Bul. 3, pp. 163–173.)

BARN OWL (Aluco pratincola).

Length, about 17 inches. Facial disk not circular as in our other owls; plumage above, pale yellow; beneath, varying from silky white to pale bright tawny.

Range: Resident in Mexico, in the southern United States, and north to New York, Ohio, Nebraska, and California.

Habits and economic status: The barn owl, often called monkey-faced owl, is one of the most beneficial of the birds of prey, since it feeds almost exclusively on small mammals that injure farm produce, nursery, and orchard stock. It hunts principally in the open and consequently secures such mammals as pocket gophers, field mice, common rats, house mice, harvest mice, kangaroo rats, and cotton rats. It occasionally captures a few birds and insects. At least a half bushel of the remains of pocket gophers have been found in the nesting cavity of a pair of these birds. Remembering that a gopher has been known in a short time to girdle seven apricot trees worth $100 it is hard to overestimate the value of the service of a pair of barn owls. 1,247 pellets of the barn owl collected from the Smithsonian towers contained 3,100 skulls, of which 3,004, or 97 per cent, were of mammals; 92, or 3 per cent, of birds; and 4 were of frogs. The bulk consisted of 1,987 field mice, 656 house mice, and 210 common rats. The birds eaten were mainly sparrows and blackbirds. This valuable owl should be rigidly protected throughout its entire range. (See Biol. Survey Bul. 3, pp. 132–139.)

SPARROW HAWK (Falco sparverius).

Length, about 10 inches. This is one of the best known and handsomest, as well as the smallest, of North American hawks.

Range: Breeds throughout the United States, Canada, and northern Mexico; winters in the United States and south to Guatemala.

Habits and economic status: The sparrow hawk, which is a true falcon, lives in the more open country and builds its nest in hollow trees. It is abundant in many parts of the West, where telegraph poles afford it convenient perching and feeding places. Its food consists of insects, small mammals, birds, spiders, and reptiles. Grasshoppers, crickets, and terrestrial beetles and caterpillars make up considerably more than half its subsistence, while field mice, house mice, and shrews cover fully 25 per cent of its annual supply. The balance of the food includes birds, reptiles, and spiders. Contrary to the usual habits of the species, some individuals during the breeding season capture nestling birds for food for their young and create considerable havoc among the songsters of the neighborhood. In agricultural districts when new ground is broken by the plow, they sometimes become very tame, even alighting for an instant under the horses in their endeavor to seize a worm or insect. Out of 410 stomachs examined, 314 were found to contain insects; 129, small mammals; and 70, small birds. This little falcon renders good service in destroying noxious insects and rodents and should be encouraged and protected. (See Biol. Survey Bul. 3, pp. 115–127.)

RED-TAILED HAWK (Buteo borealis).

Length, about 2 feet. One of our largest hawks; adults with tail reddish brown.

Range: Breeds in the United States, Mexico, Costa Rica, Canada, and Alaska; winters generally in the United States and south to Guatemala.

Habits and economic status: The red-tailed hawk, or "hen-hawk," as it is commonly called, is one of the best known of all our birds of prey, and is a widely distributed species of great economic importance. Its habit of sitting on some prominent limb or pole in the open, or flying with measured wing beat over prairies and sparsely wooded areas on the lookout for its favorite prey, causes it to be noticed by the most indifferent observer. Although not as omnivorous as the red-shouldered hawk, it feeds on a variety of food, as small mammals, snakes, frogs, insects, birds, crawfish, centipedes, and even carrion. In regions where rattlesnakes abound it destroys considerable numbers of the reptiles. Although it feeds to a certain extent on poultry and birds, it is nevertheless entitled to general protection on account of the insistent warfare it wages against field mice and other small rodents and insects that are so destructive to young orchards, nursery stock, and farm produce. Out of 530 stomachs examined, 457, or 85 per cent, contained the remains of mammal pests such as field mice, pine mice, rabbits, several species of ground squirrels, pocket gophers, and cotton rats, and only 62 contained the remains of poultry or game birds. (See Biol. Survey Bul. 3, pp. 48–62.)

COOPER'S HAWK (Accipiter cooperi).

Length, about 15 inches. Medium sized, with long tail and short wings, and without the white patch on rump which is characteristic of the marsh hawk.

Range: Breeds throughout most of the United States and southern Canada; winters from the United States to Costa Rica.

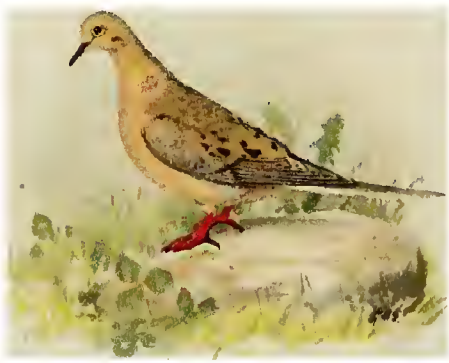
Habits and economic status: The Cooper's hawk, or "blue darter," as it is familiarly known throughout the South, is preeminently a poultry and bird-eating species, and its destructiveness in this direction is surpassed only by that of its larger congener, the goshawk, which occasionally in autumn and winter enters the United States from the North in great numbers. The almost universal prejudice against birds of prey is largely due to the activities of these two birds, assisted by a third, the sharp-shinned hawk, which in habits and appearance might well pass for a small Cooper's hawk. These birds usually approach under cover and drop upon unsuspecting victims, making great inroads upon poultry yards and game coverts favorably situated for this style of hunting. Out of 123 stomachs examined, 38 contained the remains of poultry and game birds, 66 the remains of other birds, and 12 the remains of mammals. Twenty-eight species of wild birds were identified in the above-mentioned material. This destructive hawk, together with its two near relatives, should be destroyed by every possible means. (See Biol. Survey Bul. 3, pp. 38–43.)

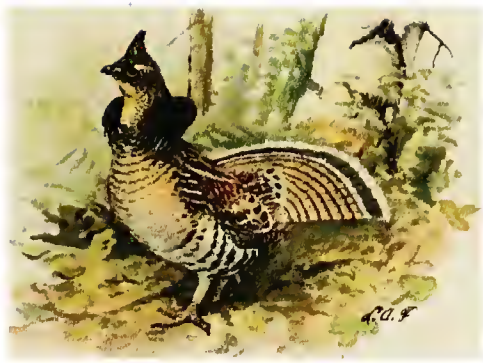
MOURNING DOVE (Zenaidura macroura).

Length, 12 inches. The dark spot on the side of the neck distinguishes this bird from all other native doves and pigeons except the white-winged dove. The latter has the upper third of wing white.

Range: Breeds throughout the United States and in Mexico, Guatemala, and southern Canada; winters from the central United States to Panama.

Habits and economic status: The food of the mourning dove is practically all vegetable matter (over 99 per cent), principally seeds of plants, including grain. Wheat, oats, rye, corn, barley, and buckwheat were found in 150 out of 237 stomachs, and constituted 32 per cent of the food. Three-fourths of this was waste grain picked up after harvest. The principal and almost constant diet is weed seeds, which are eaten throughout the year and constitute 64 per cent of the entire food. In one stomach were found 7,500 seeds of yellow wood sorrel, in another 6,400 seeds of barn grass or foxtail, and in a third 2,600 seeds of slender paspalum, 4,820 of orange hawkweed, 950 of hoary vervain, 120 of Carolina cranesbill, 50 of yellow wood sorrel, 620 of panic grass, and 40 of various other weeds. None of these are useful, and most of them are troublesome weeds. The dove does not eat insects or other animal food. It should be protected in every possible way. (See Farmers' Bul. 54, pp. 6–7.)





RUFFED GROUSE (Bonasa umbellus).

Length, 17 inches. The broad black band near tip of tail distinguishes this from other grouse.

Range: Resident in the northern two-thirds of the United States and in the forested parts of Canada.

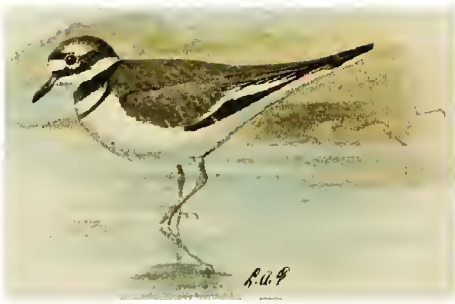
Habits and economic status: The ruffed grouse, the famed drummer and finest game bird of the northern woods, is usually wild and wary and under reasonable protection well withstands the attacks of hunters. Moreover, when reduced in numbers, it responds to protection in a gratifying manner and has proved to be well adapted to propagation under artificial conditions. Wild fruits, mast, and browse make up the bulk of the vegetable food of this species. It is very fond of hazelnuts, beechnuts, chestnuts, and acorns, and it eats practically all kinds of wild berries and other fruits. Nearly 60 kinds of fruits have been identified from the stomach contents examined. Various weed seeds also are consumed. Slightly more than 10 per cent of the food consists of insects, about half being beetles. The most important pests devoured are the potato beetle, clover-root weevil, the pale-striped flea beetle, grapevine leaf-beetle, May beetles, grasshoppers, cotton worms, army worms, cutworms, the red-humped apple worm, and sawfly larvæ. While the economic record of the ruffed grouse is fairly commendable, it does not call for more stringent protection than is necessary to maintain the species in reasonable numbers. (See Biol. Survey Bul. 24, pp. 25–38.)

BOBWHITE (Colinus virginianus).

Length, 10 inches. Known everywhere by the clear whistle that suggests its name.

Range: Resident in the United States east of the plains; introduced in many places in the West.

Habits and economic status: The bobwhite is loved by every dweller in the country and is better known to more hunters in the United States than any other game bird. It is no less appreciated on the table than in the field, and in many States has unquestionably been hunted too closely. Fortunately it seems to be practicable to propagate the bird in captivity, and much is to be hoped for in this direction. Half the food of this quail consists of weed seeds, almost a fourth of grain, and about a tenth of wild fruits. Although thus eating grain, the bird gets most of it from stubble. Fifteen per cent of the bobwhite's food is composed of insects, including several of the most serious pests of agriculture. It feeds freely upon Colorado potato beetles and chinch bugs; it devours also cucumber beetles, wireworms, billbugs, clover-leaf weevils, cotton-boll weevils, army worms, bollworms, cutworms, and Rocky Mountain locusts. Take it all in all, bobwhite is very useful to the farmer, and while it may not be necessary to remove it from the list of game birds every farmer should see that his own farm is not depleted by eager sportsmen. (See Biol. Survey Bul. 21, pp. 9–46.)



KILLDEER (Oxyechus vociferus).

Length, 10 inches. Distinguished by its piercing and oft-repeated cry—*killdee*.

Range: Breeds throughout the United States and most of Canada; winters from central United States to South America.

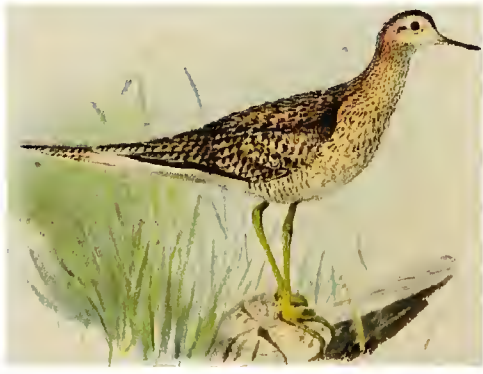
Habits and economic status: The killdeer is one of the best known of the shorebird family. It often visits the farmyard and commonly nests in pastures or cornfields. It is rather suspicious, however, and on being approached takes flight with loud cries. It is noisy and restless, but fortunately most of its activities result in benefit to man. The food is of the same general nature as that of the upland plover, but is more varied. The killdeer feeds upon beetles, grasshoppers, caterpillars, ants, bugs, caddis flies, dragonflies, centipedes, spiders, ticks, oyster worms, earthworms, snails, crabs, and other crustacea. Among the beetles consumed are such pests as the alfalfa weevil, cotton-boll weevil, clover-root weevil, clover-leaf weevil, pine weevil, billbugs, white grubs, wireworms, and leaf beetles. The bird also devours cotton worms, cotton cutworms, horse-flies, mosquitoes, cattle ticks, and crawfish. One stomach contained hundreds of larvæ of the saltmarsh mosquito, one of the most troublesome species. The killdeer preys extensively upon insects that are annoying to man and injurious to his stock and crops, and this should be enough to remove it from the list of game birds and insure its protection. (See Farmers' Bul. 497, pp. 16–18.)

UPLAND PLOVER (Bartramia longicauda).

Length, 12 inches. The only plainly colored shorebird which occurs east of the plains and inhabits exclusively dry fields and hillsides.

Range: Breeds from Oregon, Utah, Oklahoma, Indiana, and Virginia, north to Alaska; winters in South America.

Habits and economic status: This, the most terrestrial of our waders, is shy and wary, but it has the one weakness of not fearing men on horseback or in a vehicle. One of these methods of approach, therefore, is nearly always used by the sportsman, and, since the bird is highly prized as a table delicacy, it has been hunted to the verge of extermination. As the upland plover is strictly beneficial, it should no longer be classed as a game bird and allowed to be shot. Ninety-seven per cent of the food of this species consists of animal forms, chiefly of injurious and neutral species. The vegetable food is mainly weed seeds. Almost half of the total subsistence is made up of grasshoppers, crickets, and weevils. Among the weevils eaten are the cotton-boll weevil, greater and lesser clover-leaf weevils, cowpea weevils, and billbugs. This bird devours also leaf beetles, wireworms, white grubs, army worms, cotton worms, cotton cutworms, sawfly larvæ, horse-flies, and cattle ticks. In brief, it injures no crop, but consumes a host of the worst enemies of agriculture. (See Farmers' Bul. 497, pp. 14–16.)



BLACK TERN (Hydrochelidon nigra surinamensis).

Length, 10 inches. In autumn occurs as a migrant on the east coast of the United States, and then is in white and gray plumage. During the breeding season it is confined to the interior, is chiefly black, and is the only dark tern occurring inland.

Range: Breeds from California, Colorado, Missouri, and Ohio, north to central Canada; winters from Mexico to South America; migrant in the eastern United States.

Habits and economic status: This tern, unlike most of its relatives, passes much of its life on fresh-water lakes and marshes of the interior. Its nests are placed among the tules and weeds, on floating vegetation, or on muskrat houses. It lays from 2 to 4 eggs. Its food is more varied than that of any other tern. So far as known it preys upon no food fishes, but feeds extensively upon such enemies of fish as dragonfly nymphs, fish-eating beetles, and crawfishes. Unlike most of its family, it devours a great variety of insects, many of which it catches as it flies. Dragonflies, May flies, grasshoppers, predaceous diving beetles, scarabæid beetles, leaf beetles, gnats, and other flies are the principal kinds preyed upon. Fishes of little economic value, chiefly minnows and mummichogs, were found to compose only a little more than 19 per cent of the contents of 145 stomachs. The great consumption of insects by the black tern places it among the beneficial species worthy of protection.

FRANKLIN'S GULL (Larus franklini).

Length, 15 inches. During its residence in the United States Franklin's gull is practically confined to the interior and is the only inland gull with black head and red bill.

Range: Breeds in the Dakotas, Iowa, Minnesota, and the neighboring parts of southern Canada; winters from the Gulf Coast to South America.

Habits and economic status: Nearly all of our gulls are coast-loving species and spend comparatively little of their time in fresh water, but Franklin's is a true inland gull. Extensive marshes bordering shallow lakes are its chosen breeding grounds, and as many such areas are being reclaimed for agricultural purposes it behooves the tillers of the soil to protect this valuable species. When undisturbed this gull becomes quite fearless and follows the plowman to gather the grubs and worms from the newly turned furrows. It lives almost exclusively upon insects, of which it consumes great quantities. Its hearty appetite is manifest from the contents of a few stomachs: A, 327 nymphs of dragonflies; B, 340 grasshoppers, 52 bugs, 3 beetles, 2 wasps, and 1 spider; C, 82 beetles, 87 bugs, 984 ants, 1 cricket, 1 grasshopper, and 2 spiders. About four-fifths of the total food is grasshoppers, a strong point in favor of this bird. Other injurious creatures eaten are billbugs, squash bugs, leafhoppers, click beetles (adults of wireworms), May beetles (adults of white grubs), and weevils. Franklin's gull is probably the most beneficial bird of its group. (See Farmers' Bul. 497, pp. 19–22.)

OUR POLICEMEN OF THE AIR

NO ONE can read the preceding pages without an immediate desire to become personally acquainted with each of the handsome creatures pictured. How indefatigably the wrens, swallows, nighthawks, owls, red-tailed hawks, etc., are working to lighten our labors on the farm and orchard.

Birds are our best friends. They are our most efficient allies in the incessant warfare that must be waged by man against insect pests. Notwithstanding our efforts, insects are not diminishing in number, but in many localities are increasing. What would happen were birds exterminated no one can foretell with absolute certainty, but it is almost certain, says Dr. Henshaw, that within a limited time not only would it be impossible to grow fruits and grain, but the greater part of our vegetation would be destroyed.* The more carefully birds' habits are studied and their food investigated, the more apparent it is that man cannot do without them.

Pages 669-697 are an admirable illustration of the educational work conducted by our U. S. Biological Survey. The temptation to shoot a hawk or owl, perching or flying, which now is almost irresistible to many, will soon disappear when the man with the gun realizes that he is seeking to put a friend to death.

But the Biological Survey does not confine its studies to birds alone; it also helps to protect us against four-footed pests. Its experts have shown how wolves, which in recent years have become very numerous and destructive on cattle and sheep ranges, may be destroyed by poison, and it has recommended measures which, if energetically and persistently pursued, will probably result in the practical extermination of these savage animals. In some sections of the United States the damage by meadow and house mice, by prairie dogs, rats, gophers, ground squirrels, and other small gnawing animals amounts to millions of dollars a year. One of the small ground squirrels of Washington State injures the wheat crop in a single county of that State to the extent of half a million dollars annually. The Survey men are successfully devising a method to destroy these pests, and thus relieve this serious drain on the farm.

An important duty of the Biological Survey is to prevent the entrance into the United States of undesirable bird or animal immigrants. "The English sparrow serves as an ever-ready example of the disastrous consequences of the unwise introduction of a species into a new home. Under the present law and system of inspection, this pest could never have obtained a foothold in America, since so well known were the bird's habits in its native land that its disastrous career on this continent would have been foreseen and its entry prohibited.

"Under the mistaken idea that the mongoose would prove beneficial by devoting itself to the destruction of small rodents, and ignorant of the fact that the animal is omnivorous and one of the most destructive creatures in existence, more than one attempt has been made to import it into the United States, where its successful introduction would prove nothing less than a national calamity."

On pages 669-697 references are made to other publications of the Biological Survey. Several of them are out of print, but the majority may be obtained by persons desiring further information by applying to the Superintendent of Documents, Washington, D. C., and inclosing the price of the bulletins desired.

Farmers' Bulletin 54 and 497, each	$0.05
Biological Survey Bulletins 9, 13, 23, each	.05
Biological Survey Bulletin 15	.10
Biological Survey Bulletin 21	.15
Biological Survey Bulletins 30 and 44, each	.20
Biological Survey Bulletin 32	.25
Biological Survey Bulletin 34	.40
Biological Survey Bulletin 39	.30
Biological Survey Bulletin 37	.35
Yearbook, Department of Agriculture, 1895	.55

Biological Survey Bulletins 3 and 24 are out of print and cannot be supplied.

* See "Policemen of the Air," by Henry W. Henshaw, in the NATIONAL GEOGRAPHIC MAGAZINE, February, 1908.

ENCOURAGING BIRDS AROUND THE HOME

By Frederick H. Kennard

NOW that our country has really awakened to the importance of bird life to the citizens, and at last enacted some very wise legislation, forbidding the killing of migratory and insectivorous birds, putting migratory game birds under Federal control, and forbidding the importation of plumage from abroad, public interest in birds and their great economic value seems to have been stirred as never before.*

Spring will soon be here, and those of us who are thinking of doing our little toward attracting the birds must be getting ready for the early arrivals from the South.

Birds come north for the very special purpose of finding a proper place for the rearing of their young, and, this task accomplished, as autumn approaches, soon depart in search of areas where there will be throughout the winter plenty of food and cover and a more congenial climate.

If we want to make our homes attractive to birds, we must always keep the above facts in mind. If in summer we want to attract the migrants from the South, as well as the permanent residents, we must furnish them with proper places for the rearing of their young, which should include not only nesting sites, but cover, food, and water; and if in winter we want to keep some of the permanent residents about our homes and attract migrants from the North, we must remember that they are again in search of food and cover.

Once having attracted the birds, a sharp lookout must be kept in order to protect them from their enemies—cats, bird-hunting dogs, red squirrels, skunks, foxes, and other predatory animals, not forgetting the small boy that used to be ubiquitous; English sparrows, horned owls, and sometimes crows and jays, cooper and sharp-shinned hawks, and last, but not least, the black snake.

HOW TO ATTRACT THE BIRDS

To sum up, if we are to attract birds in summer, we must furnish them with proper nesting sites, cover, food, and also water; and if we want to keep them in winter, we must again furnish them with cover and food, and always protect them from their enemies.†

The most important factor in attracting birds is the supplying of cover suitable for their wants. With this properly done, except in the case of birds that nest about buildings or in holes, nature will supply the nesting sites, as well as take care of the food supply, except in winter.

At "The Pines," my place in Newton Center, Mass., we have had for eight years under close observation about 44 acres, comprising three acres of lawn dotted with a few old apple trees, six acres of wet meadow, which are allowed to grow up with tussocks of grass, cedars, alders, wild roses, and the like, and the remaining 35 acres divided in two areas of about equal size. The first of these areas, that about the house, is covered with a growth of pines, hemlocks, cedars, birches and various other deciduous trees, among which we have taken pains to cultivate suitable coppice and undergrowth, while the second area, covered with deciduous woods, is, on account of a fire that ran through it a number of years ago, almost devoid of the smaller evergreens or protecting coppice and undergrowth (see pages 319 and 320).

In the first of these areas (page 319) some thirty different species of birds

* Numerous reports on the economical value of birds have been issued by the United States Department of Agriculture. One of the best books on the subject is entitled "Birds in Their Relation to Man," by Weed and Dearborn, published by J. B. Lippincott & Co., Philadelphia, Pa.

† A useful book that every one should read who is interested in birds is "Methods of Attracting Birds," by Gilbert H. Trafton, published by the Houghton-Mifflin Co. of Boston, Mass.

ATTRACTIVE PLANTING, PARTICULARLY OF EVERGREENS, ENCOURAGES THE BIRDS Photo by Thomas E. Marr and Son

"Almost every one who lives in the country can do something in the way of attractive planting about their houses and grounds, and even in the more closely settled suburbs almost every place, no matter how small, can by judicious planting be made attractive to birds. Even a back yard may in its limited way, with proper treatment, be made a regular rendezvous for birds in the vicinity" (see page 321).

WHERE BIRDS GET FOOD AND PROTECTION

Photo by Thomas E. Marr and Son

A turn of the driveway at The Pines, showing plantation of rhododendrons, flowering dogwoods, and black alders, with an undergrowth of ferns and fox-gloves. Much frequented in summer by catbirds and chewinks, while in winter it affords both food and protection for many winter birds—provided there are no cats about the place.

A BIRD PARADISE

Photo by Thomas E. Marr and Son

A woodland path within a few feet of the residence at The Pines, flanked by undergrowth, ferns, blueberries, huckleberries, dogwoods, etc. Along this path a ruffed grouse builds its nest, as do also chewinks, black and white creepers, and oven birds, while in the trees pine and black-throated green warblers, bluejays, and robins also build their nests.

Photo by Thomas E. Mairs and Son

ANOTHER PLACE WHERE BIRDS LIKE TO NEST

A wood road at The Pines. In the thickets along its sides the catbird, cuckoo, golden-winged warbler, chestnut-sided warbler, bluejay, brown thrush, chewink, purple finch, tanager, and other birds find attractive nesting sites. This wood road runs through that portion of Mr. Kennard's place on which the undergrowth has been encouraged, and on which over thirty varieties of birds breed each year (see page 315). Contrast with the scene on page 320.

Photo by George R. King

BIRDS DO NOT LIKE THIS LAND, BECAUSE OF THE ABSENCE OF UNDERGROWTH

"The most important factor in attracting birds is the supplying of cover suitable for their wants. With this properly done, except in the case of birds that nest about buildings or in holes, nature will supply the nesting sites, as well as take care of the food supply, except in winter" (see text, page 315).

A BIRD-LOVER'S GARDEN Photo by Joseph H. Dodson

The garden of Mr. Dodson, at Evanston, Ill., showing the various devices used by him in attracting birds: bath, weathercock food-house, houses for great-crested flycatchers, bluebirds, tree-swallows, and martins, from left to right in the order named.

breed nearly every year, while in the second area only from three to five different species build their nests.

Almost every one who lives in the country can do something in the way of attractive planting about his house and grounds, and even in the more closely settled suburbs almost every place, no matter how small, can by judicious planting be made attractive to birds. Even a back yard may in its limited way, with proper treatment, be made a regular rendezvous for birds in the vicinity.

THE IMPORTANCE OF EVERGREENS

On suburban places and in the country the use of evergreens, large plantations when possible, is of prime importance as a protection from the elements, as a source of natural food supply, and on account also of the nesting sites they invariably offer. Nothing is finer than a plantation of white pine or hemlock. Spruce and balsam are beautiful and offer tempting nesting sites, while the native red cedar seems a favorite tree for the nest-builders and also contributes its berries toward the winter supply of food.

There is a huge hill at the edge of the sand dunes at Ipswich, Mass., swept by all the storms that come in from over the ocean, that years ago was as bare as a billiard ball, but upon one side of which the enterprising owner set out a large plantation of evergreens. Today that hillside is a Mecca for the birds from miles around, and noted among the bird lovers of the region for its varying bird life both winter and summer.

From an artistic standpoint, also, the use of evergreens is to be recommended. In these days, when there seems to be such an exodus from city to country, why shouldn't our country homes be made to look as attractive in winter as in summer? While we of the North may not in

A SCREECH-OWL'S FAVORITE NEST-BOX Photo by George R. King

"Of bird-houses, to be supplied for those birds that nest about buildings or in holes of trees, there seems to be an almost infinite variety; tree stumps, real or artificial, boxes, cottages, houses, large and elaborate mansions, barrel-houses, gourds, flower-pots, tin-cans, shelves, and all kinds of contraptions" (see page 339). The nest-boxes "on my place have been occupied by screech-owls, bluebirds, chickadees, tree-swallows, flickers, white-breasted nuthatches, and great-crested flycatchers" (see page 341).

winter be surrounded by the verdure of summer, we need not content ourselves with the bare poles of deciduous growth. Evergreens protect us and delight our eyes with their color and varying lights and shadows, and what is more beautiful than a pine wood or group of evergreens after a snow-storm?

Those of us who possess farms, while naturally jealous of every encroachment on our fields, can always find some place which may be planted. The immediate

Photo by Ernest Harold Baynes

FLICKERS USING A BERLEPSCH BIRD-BOX

"I have used the Berlepsch type of vertical boxes with considerable success. These are simply sections of logs, hollowed out by special machinery in a very particular manner to represent woodpeckers' cavities, with entrance hole in side of desired diameter, and covered by a wooden cap or roof that may be lifted for purposes of investigation or in order that the nests may be cleaned out from time to time, the whole bolted to an oaken batten, by which they may be fastened to trees" (see page 339).

surroundings of our farm buildings are in many cases much too bare and bleak.

The average house when surrounded by proper planting almost invariably looks better than if left to stand out cold and hard and with base-line unbroken. Wind breaks may almost always be planted somewhere, both with benefit to the farm

Photo by Joseph H. Dodson

A NEST SHELTER

A nest shelter on a tree, with a catbird going into its nest. Robins and brown thrashers also nest in them. "Of bird enemies, cats are undoubtedly the worst, and maudlin sentiment should not be wasted upon them, for they are incorrigible" (see text, page 342).

Photo by E. H. Forbush

BARN-SWALLOW ON ITS NEST

The barn-swallow is the most common of our swallows, and he arrives from the tropics in the middle of April and stays till late in September. He is a clever architect and builds his nest of mud and lines it with feathers. He generally chooses a beam or supporting shelf for his nest in the barn, and the little fellow in the picture considers that he has found an ideal location for his house.

Photo by Ernest Harold Baynes

AN AIRING ON THE ROOF

This family of young bluebirds have left their nest, which is inside the bird-box attached to the post, to take an airing on the roof of their home.

Photo by Louise Birt Baynes

LEAVING HER NEST

A female bluebird snapped as she was leaving her nest, which she has built in a Berlepsch bird-box fastened in the gate-post of Corbin Park at Meriden, N. H.

Photo by Ernest Harold Baynes

BLUEJAYS FEEDING IN WEATHERCOCK FOOD-HOUSE

"The same man builds also a sheltered food-house that turns with the wind like a weather vane, so as to present always a lee side for the better protection of the birds" (see page 332).

Photo by Thomas E. Marr and Son

A JUNCO VISITING AN AUDUBON FOOD-HOUSE

"The Audubon food-house has been much used on this side of the water and is most satisfactory. It consists of a square hip roof, with vertical glass sides suspended beneath and open at the bottom, the whole supported on a central rustic cedar post, encircled with food trays beneath the roof. The glass sides protect the food trays from the weather and at the same time admit light and allow of easy observation. These, when placed among the shrubbery about one's house, prove most attractive" (see pages 331 and 332).

as well as to the birds, while lanes may be bordered with trees and shrubbery and walls covered with vines without any possible encroachment on the fields. An old pasture planted with savin and white pine, hawthorns, elders, barberries, cornels, viburnums, and the like, may easily be metamorphosed into a bird reservation and still be useful as a pasture.

For deciduous growth to be used for cover, choose those berry-bearing trees and shrubs whose berries are most popular with the birds; and, when possible, choose also those that may offer most convenient sites for nest-building.

SOME USEFUL FOOD PLANTS

Care must also be taken in the choice of species, so as to get, if possible, a continuous supply of food, using such plants as the cherry, mulberry, raspberry, blueberry, huckleberry, etc., for the summer supply; elder and the various kinds of dogwood and viburnum, etc., for autumn; while for winter choose those plants which hold their fruit longest, such as the hawthorn, buckthorn, mountain ash, barberry, bayberry, sumach, wild rose, and the like.

Hedges, particularly if they are evergreen, are favorite resorts for birds, both in winter and summer, and an arbor-vitæ hedge is the best of them all. I remember such a hedge about one side of my father's old-fashioned garden that in summer invariably held its quota of robins', song sparrows', and chipping sparrows' nests, while in winter it was the

PAYING A MIDWINTER VISIT Photo by Wilbur F. Smith

This shows a bird visitor attracted by the lump of suet fastened to the old pear tree. A lump of suet set in some convenient place is perhaps the surest way of securing bird visitors in midwinter, for it is a food supply they greatly appreciate.

protected resort of such birds as stayed with us.

In the Year Book of the Department of Agriculture for 1909 there is a most interesting article on "Plants Useful to Attract Birds and Protect Fruit," by W. L. McAtee. In this there is a list, on page 186, of the best trees and shrubs for attracting birds, given in the order of their attractiveness, as follows: Elders, raspberries and blackberries, mulberries, dogwood fruits, sumachs, wild cherries, blueberries, wild grapes, pokeberries, Virginia creeper berries, bayberries, juniper berries, service berries, holly berries, strawberries, the fruits of viburnums, hackberries, huckleberries, haws, spicebush berries, rose hips, sarsaparilla, sour gum, gooseberries, currants, and snowberry.

To the above list is added the following supplementary list of some other plants known to be attractive to birds, and to this the names of other species doubtless might be added: Manzanita, barberry, buffalo berry, silverberry, buckthorn, mountain ash, China berry, California Christmas berry, pepper tree, magnolia, nockaway, lote bush, and bluewood.

With the above very comprehensive lists to choose from, it is not a difficult matter to make out a list of trees and shrubs for almost any place, no matter how small, that will supply its quota of birds' food from early summer to the following spring, while if the place is a large one, or the problem at all difficult, it may be the best policy, as well as in the end the most economical, to consult some competent landscape architect as to the proper disposition of the proposed plantations. What is worth doing at all is always worth doing well.

Besides the trees and shrubs in the above lists, there are many herbaceous plants whose seeds are attractive to birds

Photo by Ernest Harold Baynes

FLOCK OF QUAIL AT A FOOD STATION

"In bad weather, however, particularly in the North, where we are so apt to be covered up with snow, more artificial means of feeding should be resorted to, and food stations, food-houses, and food shelters of various sorts should be established in proper places. If quail or grouse are to be fed, inconspicuous bough shelters may be built in protected places among the fields or woods most frequented by them" (see page 331).

Photo by Ernest Harold Baynes

PINE SISKINS AND RED POLLS FEEDING ABOUT A HOUSE: NEW HAMPSHIRE

The pine siskin is a lover of evergreens and spends the winter wandering from copse to copse in search of seeds and pine cones. The red poll is a winter visitor from the far North, and with its rich crimson head and breast makes a pretty picture in the snow.

Photo by Ernest Harold Baynes

A SHY HAIRY WOODPECKER AT DINNER

The hairy woodpecker is a somewhat shy bird, who prefers the forest to the orchard and is not often seen about the house. His note is louder and sharper than that of most woodpeckers and cannot by any stretch of the imagination be called musical.

Photo by Louise Birt Baynes

A FRIENDLY CHICKADEE

The chickadee is found in all parts of the East, from Labrador to Maryland, and in all seasons of the year, but is seen most often in winter. They are unusually companionable birds and their tameness, quaint notes, and friendly ways make them general favorites.

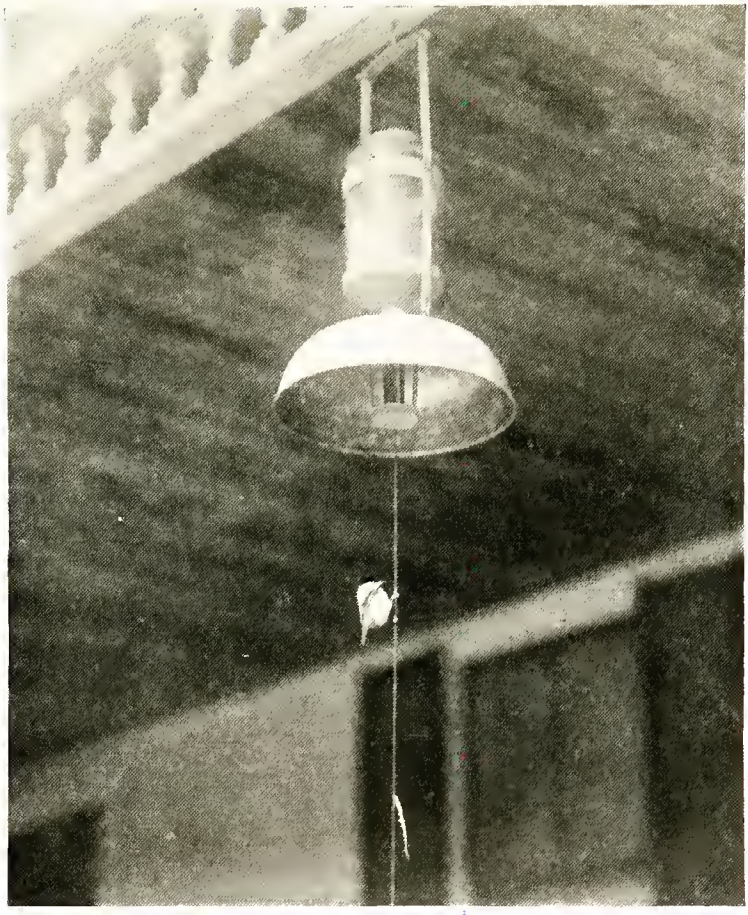


Photo by Ernest Harold Baynes

THE FOOD BELL

"Baron von Berlepsch has invented a food bell that supplies grain, etc., automatically from a receptacle above, and which may be suspended from a tree or piazza roof or any other place that seems best" (see page 332).

Sunflowers may be planted in groups about the flower garden or in lines among the rows of vegetables; wild sarsaparilla and pokeberry along the boundary walls; while if you have a corner somewhere in the fields that can be planted with buckwheat and Japanese millet, it will prove a great attraction, particularly in winter.

FOOD-HOUSES AND SHELTERS

In bad weather, however, particularly in the North, where we are so apt to be covered up with snow, more artificial means of feeding should be resorted to, and food stations, food-houses, and food shelters of various sorts should be established in proper places. If quail or grouse are to be fed, inconspicuous bough shelters may be built in protected places among the fields or woods most frequented by them, while about the house or among the neighboring plantations all sorts of devices may be resorted to.

Baron von Berlepsch, in Germany, has invented a food-house, an adaptation of which, called the Audubon food-house has been much used on this side of the water, and is most satisfactory (see page 327). It consists of a square hip roof, with vertical glass sides suspended beneath and open at the bottom, the whole supported on a central rustic cedar post, encircled with food trays beneath the roof. The glass sides protect the food

Photo by Ernest Harold Baynes

A BLUEJAY FEEDING ON SUET

"Perhaps the simplest scheme of feeding, the least trouble, and the most attractive to numbers of birds, is the tying of a piece of suet to a convenient limb, or perhaps to the balustrade of one's piazza, preferably in a protected spot and one that can at the same time be easily watched from some window" (see page 333).

trays from the weather and at the same time admit light and allow of easy observation. These, when placed among the shrubbery about one's house, prove most attractive.

Baron von Berlepsch has invented also a food bell that supplies grain, etc., automatically from a receptacle above, and which may be suspended from a tree or piazza roof, or any other convenient place (see page 331).

Window boxes are a never-ceasing source of enjoyment. Mr. Ernest Harold Baynes built the first I ever saw at his home in Meriden, N. H., a particularly attractive one, which has helped him to become intimate with an astonishing variety of birds (see page 336).

Food shelves may be put up in all sorts of protected places—about houses, against tree trunks, etc.; and a food car, a sort of moving free-lunch counter, which may be run conveniently on a wire from window to neighboring tree, is actually manufactured by one enterprising gentleman; and the same man builds also a sheltered food-house that turns with the wind like a weather vane, so as to present always a lee side for the better protection of the birds (see page 326).

Baron von Berlepsch originated also what he calls a food tree, a freshly cut evergreen, preferably spruce or fir, or perhaps a discarded Christmas tree, set up in some convenient place, over which has been poured hot, and then allowed to cool, a mixture of food that is attractive to both insectivorous and graminivorous birds, the receipt for which is given in the little book, "How to Attract and Protect Wild Birds":*

"White bread (dried and ground), 4½ oz.; meat (dried and ground), 3 oz.; hemp, 6 oz.; crushed hemp, 3 oz.; maw, 3 oz.; poppy flour, 1½ oz.; millet (white)

*For sale by the National Association of Audubon Societies, 1974 Broadway, New York City, N. Y. Price, 40 cents.

3 oz.; oats, 1½ oz.; dried elderberries, 1½ oz.; sunflower seeds, 1½ oz.; ants' eggs, 1½ oz."

A SIMPLE AND ATTRACTIVE FOOD SUPPLY

Perhaps the simplest scheme of feeding, the least trouble and the most attractive to numbers of birds, is the tying of a piece of suet to a convenient limb, or perhaps to the balustrade of one's piazza, preferably in a protected spot and one that can at the same time be easily watched from some window (see page 332).

In all these food-houses various kinds of food should be supplied — suet, crumbs, millet, hemp, rape-seed, canary-seed, and the like. On my place the birds have such a wealth of natural food that it is only during the winter storms and when the ground is covered with snow that they visit the food-houses; but on many other places — as, for instance, in Meriden, N. H., where Mr. Baynes and the Meriden Bird Club are doing such good work—there have been food-houses erected on places along the main street, entirely apart from any protecting shrubbery or natural food supply, and many of these food-houses seem to be well patronized both winter and summer.

Photo by B. S. Bowdish

ON INTIMATE TERMS

This jolly little white-breasted nuthatch has just taken a dainty morsel from the lips of its friend. These little birds are very clever climbers and can run up and down tree trunks in the most agile manner.

Water, particularly during the summer months or times of drought, is, of course, necessary for the birds. If they can't get it on your place, they will be forced to look elsewhere. The proper installment of a drinking fountain or bird bath is a simple affair, and one that is almost sure to prove a great attraction to the birds, as well as a never-failing source of entertainment to the owner.

Drinking fountains may be purchased ready made or manufactured at home. Almost any shallow receptacle will do when placed in some quiet spot not too far from protecting shrubbery, but out of reach of skulking cats. Where the cats have not all been eliminated, it is sometimes safer to place the bath on a pedestal.

A pool with foundation of concrete sunken in the ground, partially filled with earth and stones and planted with cat-tails, Japanese iris, or other moisture-loving plants, or perhaps with water-lilies and inhabited by a few goldfish, can be made a very interesting feature of any garden, to say nothing of its attractiveness to birds. It is essential, however, that the slope of the sides should be gradual and the water at the edges shallow (see pages 338 and 339).

If one has a brook or natural pond on the place, much can be done, particularly if the bottom of the pond is suitable for the planting of food for ducks. If the lay of the ground is such that a meadow

LUNCHEON FOR TWO

Photo by Louise Birt Baynes

In the midst of a tramp across the winter snow the naturalist halts for a rest and a little lunch, to which he invites a passing bird friend. Cordial relations have already been established, but the repast has not yet been begun (see picture, page 335)

A SANDWICH FOR TWO — Photo by Louise Birt Baynes

Having accepted the invitation, the bird settles down to enjoy his meal. The fact that he must share a sandwich with his host does not disturb him, for, like all birds, he is quick to recognize and trust a human friend (see picture, page 334).

or woodland glade may be flooded and a pond thereby installed, there is hardly any limit to the enjoyment that may be derived from a pond of this sort.

ATTRACTING THE WILD DUCK

There is a little woodland glade, containing an acre or so, on my place, an opening in the woods surrounded by red maples, birches, alders, poison sumach, white azalea, high-bush blueberries, etc., which I flooded one winter merely as a safe skating pond for the children in the neighborhood.

Imagine my surprise and delight when one spring day, after the ice had gone out, I discovered there a whole flock of wild wood-ducks, and later during the summer was able to watch a flock of little "flappers," the progeny of a pair of wild black ducks that had bred there. Herons came there, too, and red wings frequented the edge of the pond. From an uninteresting swamp the place had been

THE HOSTESS ENTERTAINS — Photo by Ernest Harold Baynes

"Window boxes are a never-ceasing source of enjoyment. Mr. Ernest Harold Baynes built the first I ever saw, at his home in Meriden, N. H., a particularly attractive one, which has helped him to become intimate with an astonishing variety of birds" (see page 332).

TAKING THE CAKE — Photo by Louise Birt Baynes

This photo shows how responsive birds are to a little attention and how tame they may become. This wild chickadee will enter the house, perch upon his favorite delicacy, and enjoy a meal in no way affrighted by the presence of his human entertainers.

WHAT BIRDS CAN DO — Photo by Joseph H. Dodson

A great-crested flycatcher house, with bluebird, suspended from a pear tree, from which Mr. Dodson last year picked eight bushels of pears with not a worm hole in one, and that notwithstanding the fact that the tree had never been sprayed. A flycatcher is certainly a cheaper investment than a spraying-machine.

"About houses and buildings, particularly those on our farms, the ordinary type of bird-house rather than the hollow log is perhaps more appropriate. Bluebirds, tree-swallows, and house-wrens take to them readily, and if you have a large house on a high pole you may be lucky enough to attract a colony of martins" (see text, page 341).

completely metamorphosed into a very attractive and interesting spot, replete with bird life.

If wild rice can be made to grow, ducks will be sure to come in greater numbers each year, while regular feeding with corn at proper times may prove an additional attraction to whole flocks of ducks during the migration. Tame call-ducks may be introduced, and if there are near-by woods nest boxes for the attraction of the wood-ducks should be put up.

One may even go into the raising of ducks, though this is often both bothersome and expensive, while the simple flooding of a meadow and intelligent planting of its shores is comparatively little trouble.

Mr. Herbert K. Job, State Ornithologist of Connecticut, is having some very interesting experiences on a game preserve in Connecticut, where low-lying areas have been flooded and the wild ducks attracted in increasing numbers each year from miles around (see picture, page 338).

I know of one man in Canada who several years ago fed a small flock of wild geese that chanced to alight in a pond close beside his house. The geese appreciated the treatment so much that they later returned with friends, and have kept it up from year to year until now I believe that he has had at one time several hundred wild geese virtually in his front yard, and in a very exposed

A FLOCK OF MALLARDS AS VISITORS Photo by Dr. John C. Phillips

"If wild rice can be made to grow, ducks will be sure to come in greater numbers each year, while regular feeding with corn at proper times may prove an additional attraction to whole flocks of ducks during the migration. Tame call-ducks may be introduced, and if there are near-by woods, nest-boxes for the attraction of the wood-ducks should be put up" (see page 337).

WILD BLACK DUCK ON A GAME PRESERVE Photo by Herbert K. Job

"Mr. Herbert K. Job, State Ornithologist of Connecticut, is having some very interesting experiences on a game preserve in Connecticut, where low-lying areas have been flooded and the wild ducks attracted in increasing numbers each year from miles around" (see page 337).

SONG-SPARROWS TAKING A BATH Photo by Ernest Harold Baynes

"A pool with foundation of concrete sunken in the ground . . . can be made a very interesting feature of any garden, to say nothing of its attractiveness to birds. It is essential, however, that the slope of the sides should be gradual and the water at the edges shallow" (see page 333).

position at that. They seem absolutely fearless, come and go at will, though only a short distance away are gunners who are waiting to take a crack at them.

Only a few of us have ponds to which geese may be attracted, but the above experiment shows what can be and has been done in the way of attracting and taming locally the shy wild geese.

HOUSES FOR THE BIRDS

Of bird-houses, to be supplied for those birds that nest about buildings or in holes of trees, there seems to be an almost infinite variety; tree stumps, real or artificial, boxes, cottages, houses, large and elaborate mansions, barrel-houses, gourds, flower-pots, tin-cans, shelves, and all kinds of contraptions.

Mr. Ernest Thompson Seton went so far as to construct on his place in Connecticut a huge artificial stump, filled with imitation woodpeckers' holes, etc. He attracted numbers of different kinds of birds and animals, and he seems to have had no end of fun with it. It is not allowed to all of us, however, to be given either the opportunity or the enthusiasm possessed by Mr. Seton.

Of the various kinds of houses space will allow but brief mention. On my own place, which is covered largely with woods, I have used the Berlepsch type of vertical boxes with considerable success. These are simply sections of logs, hollowed out by special machinery in a very particular manner to represent woodpecker cavities, with entrance hole in side of desired diameter, and covered by a wooden cap or roof that may be lifted for purposes of investigation or in order that the nests may be cleaned out from time to time, the whole bolted to an oaken batten, by which they may be fastened to trees (see pages 323 and 325).

These may be obtained in Germany,

A BALTIMORE ORIOLE AFTER A BATH Photo by Ernest Harold Baynes

The Baltimore oriole is remarkable for its bright colors, and to these it owes its name, as the livery of the Lords Baltimore, who founded Maryland, was orange and black of just those tones that the bird exhibits. Cats have been eliminated on this place.

A BROWN THRASHER BATHING Photo by Louise Birt Baynes

"Water, particularly during the summer months or times of drought, is necessary for the birds. If they can't get it on your place, they will be forced to look elsewhere. The proper installment of a drinking fountain or bird bath is a simple affair, and one that is almost sure to prove a great attraction to the birds, as well as a never-failing source of entertainment to the owner" (see text, page 333).

A COLONY OF EAVE SWALLOWS Photo by Fred B. McKechnie

This colony of swallows built their nests beneath the eaves of a barn at Luenburg, Vt. Note the partial support given by the narrow molding. These eave swallows become much attached to their homes, and if undisturbed will return year after year with unfailing regularity.

but are now manufactured by at least two people in this country. Those on my place have been occupied by screech-owls, bluebirds, chickadees, tree-swallows, flickers, white-breasted nuthatches, and great-crested flycatchers. House-wrens, which are very local in our part of the country, have so far avoided them, and I have failed ignominiously to attract either the downy or the hairy woodpeckers, both of which frequent my woods.

One firm makes bird-houses out of natural hollow logs or limbs, a hole bored in the side, and with wooden cap and bottom, while another makes an imitation woodpecker's nest of pottery. The Berlepsch type are, however, in my opinion, far and away ahead of these others.

BIRDS THAT WILL NEST IN PREPARED HOUSES

About houses and buildings, particularly those on our farms, the ordinary type of bird-house rather than the hollow log is perhaps more appropriate. Bluebirds, tree-swallows, and house-wrens take to them readily, and if you have a large house on a high pole you may be lucky enough to attract a colony of martins. Chickadees, great-crested flycatchers, and screech-owls may use these boxes, and the following is a list of birds recorded as having bred in nest boxes of one sort or another:

Wood-duck, sparrow-hawk, screech-owl, flicker, red-headed woodpecker, great-crested flycatcher, starling, Eng-

Photo by Louise Birt Baynes

THE DAINTIEST GUEST

A picture of an inquisitive and very puzzled humming-bird probing an artificial flower

lish sparrow, house-finch, tree and violet green swallow, purple martin, house-wren, Parkman's wren, Bewick's wren, Vigor's wren, and Texas Bewick's wren, white-breasted nuthatch, tufted titmouse, black-capped chickadee, Oregon chickadee, Carolina chickadee, robin, and three varieties of bluebirds—eastern, western, and mountain. To this list the Carolina wren ought probably to be added; though while I do not know personally of any record of its actually building in a bird-box, it builds about houses and in the most unheard of and crazy places.

Robins and phœbes may be encouraged by shelves conveniently placed beneath the roofs of porches, piazzas, and sheds, while the insect-eating barn and eave swallows may often be helped in their choice of nesting sites by a supporting shelf. Vines on trellises or about the piazza posts are attractive nesting sites for chipping sparrows, as well as robins, and I once knew of a bluejay that built in a wistaria vine overhanging a friend's front porch.

One can never tell just what birds are going to do. Crows are reported to have nested in one of the squares in the city of Philadelphia and on Beacon Hill in Boston, while a pair of sparrow-hawks have bred beneath the eaves of the Lawrence Scientific School in Cambridge, Mass.

Chimney swifts should also be encouraged, and when possible the chimneys

MOTHER AND DAUGHTER

Photo by Ernest Harold Baynes

This is a photo of a wild chickadee feeding her young in June. She does not fear in summer the hand that feeds her in winter

Photo by Ernest Harold Baynes

THE BEST KIND OF A BIRD ON A HAT

left open at the top, and so constructed as to admit of their ready occupancy.*

THE ENEMIES OF THE BIRDS

Of bird enemies, cats are undoubtedly the worst, and maudlin sentiment should not be wasted upon them, for they are incorrigible. The plain, ordinary alley cat should be eliminated when possible, and they make fine fertilizers when planted about the roots of one's favorite grape-vine. Cat-possessing neighbors should be warned that if their cats are caught trespassing they will be turned into fertilizer.

Red squirrels are next on the list and should be shot on sight, but I have never found the depredations of the gray squirrel to warrant similar treatment. Bird-chasing dogs are a nuisance and should be restrained during the breeding season.

Skunks and foxes should both be discouraged, and the wily raccoon and elusive weasel also, if perchance they are found to lurk about.

Of the hawks, the cooper and sharp-shinned hawks should both be shot at sight, while of the owls, the great horned is incapable of reform. The little screech-owl is almost always beneficial on account of the numbers of mice it often de-

* One of the most absorbing and interesting books of the present day, replete with information on the above subject, called "Useful Birds and Their Protection," by Edward Howe Forbush, State Ornithologist of Massachusetts, has been published by the Massachusetts Board of Agriculture and may be obtained from them for the sum of $1.00.

stroys, but individual screech-owls are often destructive to bird life.

Crows and jays will bear watching. There seem to be good crows and jays, and then again individuals among them of exceeding bad habits, as many a long-suffering bird family knows to its sorrow.

In many places the English sparrows are pests and should be shot and trapped relentlessly. They are pretty canny birds, and if once they learn you are after them with a gun they quickly desert the premises. If owing to surrounding conditions gunning for them seems undesirable, traps may be used with telling effect. There are several kinds in use in this country.

Last, but not least, the black snake should be killed whenever found; its large size, great activity, tree-climbing propensities, and taste for eggs and small birds have fairly won for it the reputation of being one of the birds' deadliest enemies.

OUR GREATEST TRAVELERS

Birds that Fly from Pole to Pole and Shun the Darkness: Birds that Make 2,500 Miles in a Single Flight

By Wells W. Cooke

Of the Biological Survey, U. S. Department of Agriculture

THE migration of birds has long been considered an unfathomable mystery, but late investigations have furnished abundant data on the when and where of migration and solved many of its puzzles. The Bureau of Biologic Survey of the United States Department of Agriculture has collected much information on the migration of North American birds, and this article is an attempt to put in popular form some of the data that have already appeared in the more technical bulletins and reports. No correct understanding of bird migration is possible until it is considered as a voluntary evolution. All migratory movements must have begun with changes of location, which were only very slight.

From this short migration, benefit accrued to individuals or to their posterity. Migration became a fixed habit, and the distance covered gradually—very gradually—increased as each succeeding extension proved advantageous. It is not to be supposed that every attempted extension was a success; in fact, it is more probable that only a small part of the experimental pioneering routes were permanently adopted.

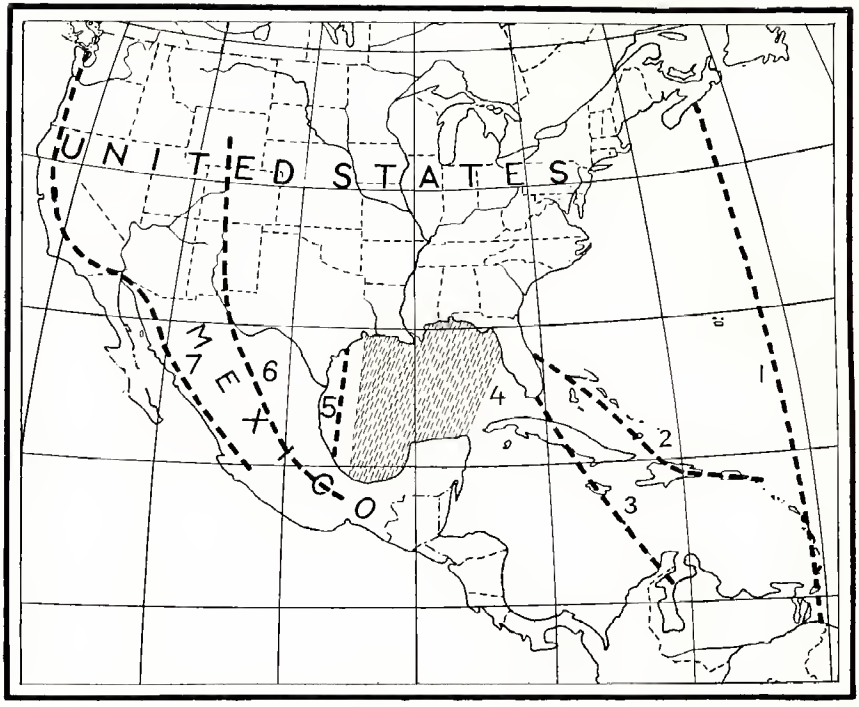
Moreover, it must be borne in mind that the time occupied in the establishment of present migration habits and routes was measured in geologic ages, and there is no reason to suppose that changes took place during these ages any faster than they do now.

It is about a hundred years since the first reliable notes on migration in the United States were recorded, and this period has proven too short to show any perceptible difference in its time, direction, or speed. It can be affirmed, then, that the migration routes of today are the results of innumerable experiments as to the best way to travel from the winter to the summer home and return.

It can also be said that food supplies en route have been the determining factor in the choice of one course in prefer-

Photo by George Shiras, 3rd

TWO GROUND DOVES AT THE BAIT, WHILE A MALE CARDINAL LOOKS ON



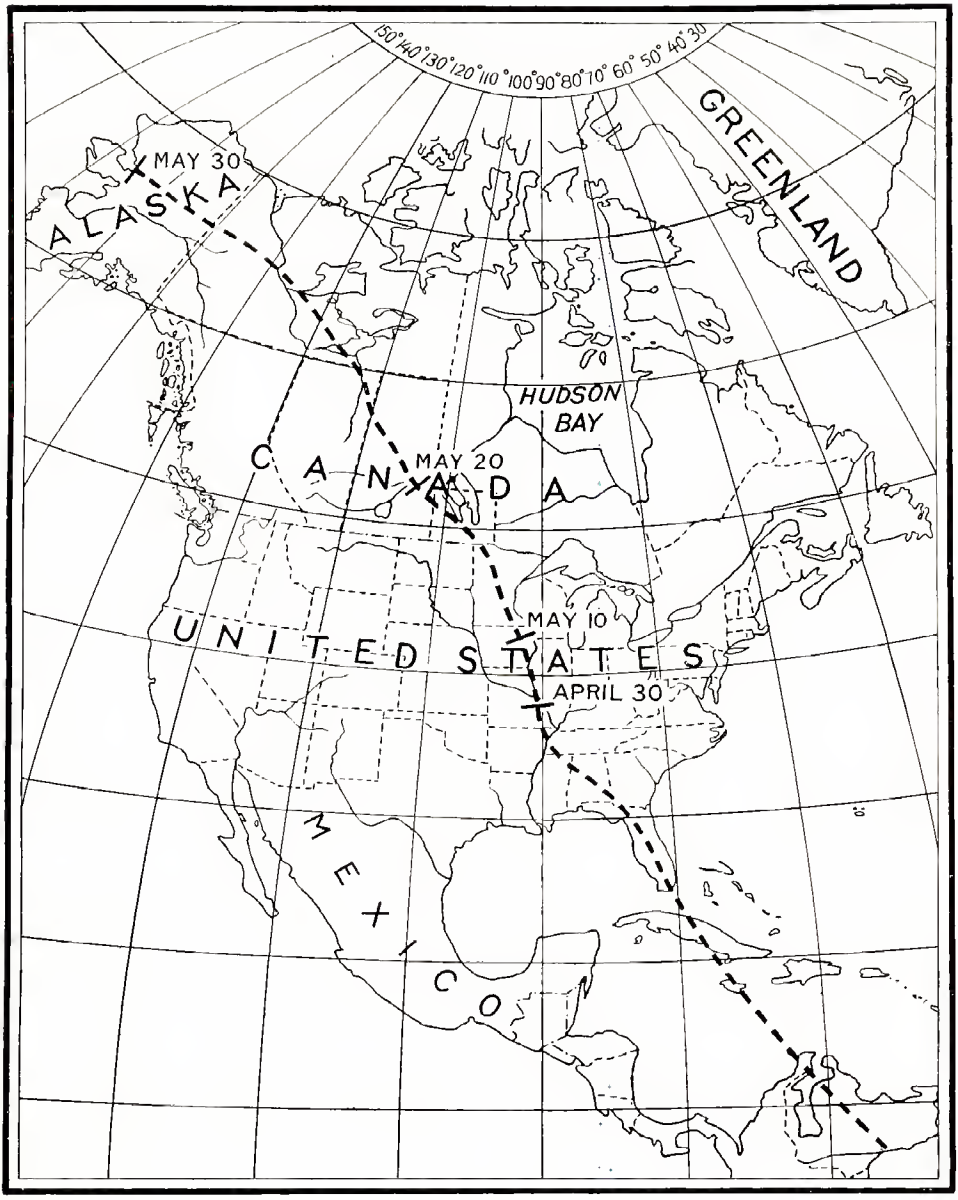
MAP SHOWING THE PRINCIPAL ROUTES USED BY BIRDS IN THEIR MIGRATIONS BETWEEN NORTH AND SOUTH AMERICA

ence to another, and not the distance from one food base to the next. The location of plenty of suitable provender having been ascertained, the birds pay no attention to the length of the single flight required to reach it.

PRINCIPAL MIGRATION ROUTES OF NORTH AMERICA

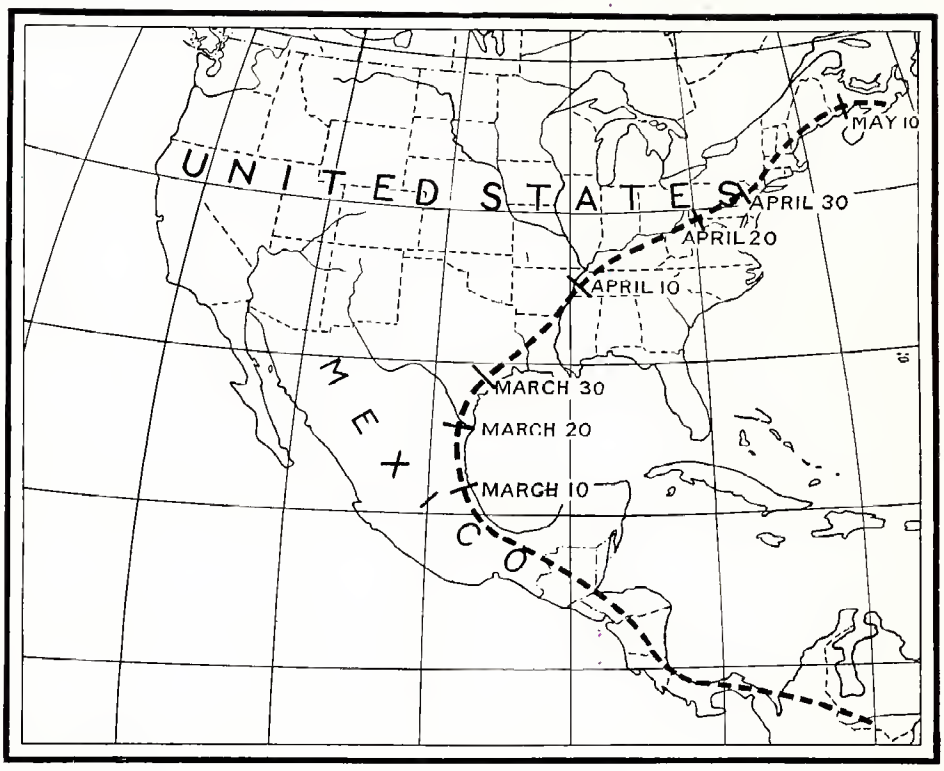
The shape of the land areas in the northern half of the Western Hemisphere has tended to great variations in migratory movements. If the whole area from Brazil to Canada were a plain with the general characteristics of the middle section of the Mississippi Valley, the study of bird migration would lose much of its fascination. There would be a simple rhythmical swinging of the migration pendulum back and forth spring and fall. But a large part of the space between Brazil and Canada is occupied by the Gulf of Mexico, the Caribbean Sea, and parts of the Atlantic Ocean, all devoid of sustenance for land birds. The two areas of abundant food supplies are North America and northern South America, separated by the comparatively small land areas of Mexico and Central America, the islands of the West Indies, and the great stretches of foodless waters.

The different courses taken by the birds to get around or over this intervening inhospitable region are almost as numerous as the bird families that traverse them, and only some of the more important ones are shown on the accompanying map (page 347). The routes are numbered from the east westward, the middle one, No. 4, being by far the most important. In general it may be said to extend from northwestern Florida and western Louisiana across the Gulf of Mexico to the southern coast of the Gulf (Yucatan to Vera Cruz), and



MIGRATION ROUTE OF THE BLACK-POLL WARBLERS THAT NEST IN ALASKA

This bird winters in South America alongside the cliff swallow, hut in summer seems to try and get as far as possible from its winter neighbor. Note how its northward route diverges from the northward flight of the cliff swallow, shown on the map on the opposite page. It travels at night, often flying several hundred miles in the darkness (see pages 349, 351, and 363).



MIGRATION ROUTE OF THE CLIFF SWALLOWS THAT NEST IN NOVA SCOTIA (SEE PAGES 348, 351, AND 365)

The swallow, unlike the warbler, travels by day

thence by land through Central America to South America. Probably more individuals follow this route than all the other routes combined.

The birds east of the Alleghany Mountains move southwest in the fall approximately parallel with the seacoast, and most keep this same direction across the Gulf to eastern Mexico. The birds of the central Mississippi Valley go southward to and over the Gulf. The birds between the Missouri River and the edge of the plains, and those of Canada east of the Rocky Mountains, move southeastward and south until they join the others in their passage of the Gulf.

In other words, the great majority of North American birds bound for a winter's sojourn in Central or South America elect a short cut across the Gulf of Mexico in preference to a longer land journey by way of Florida or Texas. In fact, millions of them cross the Gulf at its widest part, which necessitates a single flight of 500 to 700 miles.

The peninsula of Florida extends far to the south, and the great island of Cuba forms a convenient stepping-stone between its coast-line and Yucatan. A bird taking this highway would avoid any long single flight; yet, with the exception of a few day-migrating swallows, no bird is known to follow this route. A probable explanation is that southern Florida has vastly less bird food per square mile than the country to the

northward, and the birds prefer a single long flight with abundant rations to a series of shorter flights on scantier fare.

Migration route No. 3, which is by way of Cuba and Jamaica, offers a much shorter journey to South America, but it is traversed by only a few species. It is popular as far as Cuba with some 60 species, of whom great numbers spend the winter on the island; about 30 of these species have a small contingent who pass on to make Jamaica their winter resort; but scarcely more than 10 species try the final long flight across the Caribbean Sea to South America. Among these are one species each of six widely differing families—the bank swallow, gray kingbird, Florida nighthawk, Alice thrush, blackpoll warbler, and bobolink. The other members of those families employ entirely different migration routes.

It is not possible to ascertain whether these travelers on the so-called "bobolink route" represent adventurous species that are seeking to improve on the roundabout course through Mexico, or old fogies who hold to the way of their forefathers long after their brethren have proven to their own satisfaction the superior advantages of the more western route.

The next route to the eastward, No. 2, traverses the chain of islands that extend from Florida to South America. This, too, is considerably shorter than the Florida-Yucatan route, and land can always be kept in sight; yet this line also is discredited. A few individuals of about 25 species follow it as far as Porto Rico, and only 6 of these continue to the South American coast, and these last in such diminished numbers as to form an insignificant fraction of the winter visitants in that region.

The explanation, of course, lies in the question of food. The combined area of all the West India islands east of Porto Rico is so small that it could not furnish subsistence for even one per cent of the myriads of birds which throng the main migration route across the Gulf.

To the westward the short route, No. 5, stretches a few hundred miles from the coast of Texas to northern Vera Cruz. It is adopted by a few Kentucky warblers, worm-eating warblers, golden-wing warblers, and some others, who seek in this way to avoid a slow journey by land across a region scantily supplied with moist woodlands.

Still farther west, routes 6 and 7 represent the land journeys of those birds from the western United States who winter in Mexico and Central America. Their trips are comparatively short; most of them are content to stop when they have reached the middle districts of Mexico, and only a few pass east of the southern part of that country.

Route No. 1 remains to be noticed. It extends in an approximately north-and-south line from Nova Scotia to the Lesser Antilles and the northern coast of South America. Though more than a thousand miles shorter than the main migration route, it is not employed by any land bird. But it is a favorite fall route for thousands of water birds, and as such will be referred to again more in detail.

It must not be considered that these routes as outlined on the map represent distinctly segregated pathways with clearly defined borders. On the contrary, they are merely convenient subdivisions of the one great flightway which extends from North to South America. There is probably no single mile in the whole line between northern Mexico and the Lesser Antilles which is not crossed each fall by migrating birds. What is meant is that the great bulk of the birds, both as to species and number of individuals, cross the Gulf to eastern Mexico, while to the eastward their numbers steadily diminish.

LIGHT-HOUSES LURE THOUSANDS OF BIRDS TO DESTRUCTION

It is not to be supposed that these long flights over the waters can occur without many casualties, and not the smallest of the perils arises from the beacons which man has erected along the coast to insure his own safety. "Last night I could have filled a mail-sack with the bodies of little warblers which killed themselves striking against my light," wrote the keeper

of Fowey Rocks light-house, in southern Florida.

Nor was this an unusual tragedy. Every spring the lights along the coast lure to destruction myriads of birds who are en route from their winter homes in the South to their summer nesting places in the North. Every fall a still greater death-toll is exacted when the return journey is made.

Lighthouses are scattered every few miles along the more than 3,000 miles of our coast-line, but two light-houses—Fowey Rocks and Sombrero Key—are responsible for far more bird tragedies than any others. The reason is twofold: their geographic position and the character of their lights. Both are situated at the southern end of Florida, where countless thousands of birds pass each year to and from Cuba. Both lights are of the first magnitude, on towers 100-140 feet high, and Fowey Rocks has a fixed white light, the deadliest of all.

A red light or a rapidly flashing one repels the birds, but a steady white light piercing the storm and fog proves irresistible. From whatever direction they approach they veer to windward, and then, flying against the wind, seek the object of their infatuation. The larger part do not strike with sufficient force to injure themselves, but, like great moths, they flutter in and out of the light's rays, and finally settle on the platform or framework to await the abatement of the storm or the coming of sufficient daylight to enable them once more to orient themselves.

NEIGHBORS IN WINTER AND REMOTE STRANGERS IN SUMMER

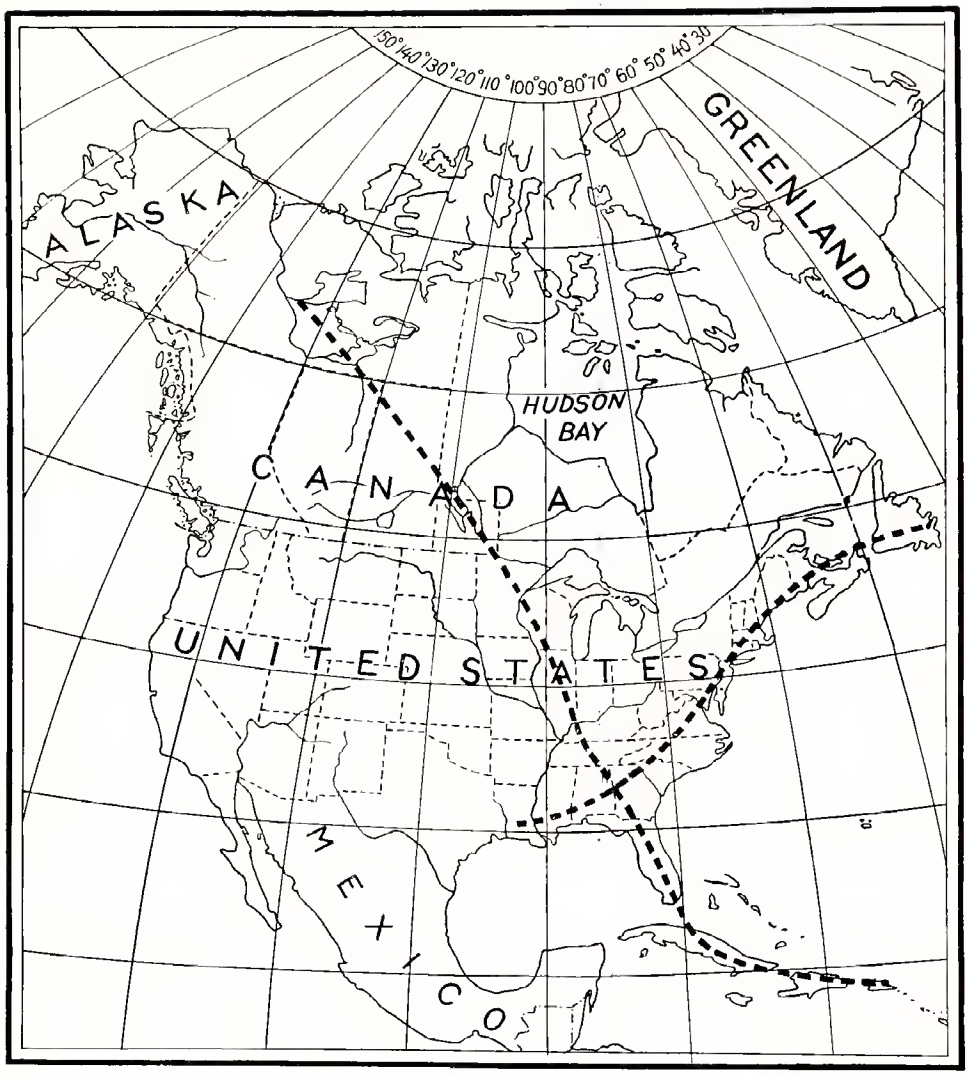
The next two maps (pages 348 and 349) show the extremes of direct and circuitous routes of migration. All black-poll warblers winter in South America. Those that are to nest in Alaska strike straight across the Caribbean Sea to Florida and go northwestward to the Mississippi River. Then the direction changes and a course is laid almost due north to northern Minnesota, in order to avoid the treeless plains of North Dakota. But when the forests of the Saskatchewan are reached, the northwestern course is resumed and, with a slight verging toward the west, is held until the nesting site in the Alaska spruces is attained.

The cliff swallows are winter neighbors in South America of the black-poll warblers. But when in early spring nature prompts the swallows who are to nest in Nova Scotia to seek the far-off land where they were hatched, they begin their journey to that region—which is situated exactly north of their winter abode—by a westward flight of several hundred miles to Panama. Thence they move leisurely along the western shore of the Caribbean Sea to Mexico and, still avoiding any long trip over water, go completely around the western end of the Gulf. Hence as they cross Louisiana they are moving in the opposite direction from that in which they started. A northeasterly course from Louisiana to Maine, and an easterly one to Nova Scotia, completes their spring migration. This circuitous route has added more than 2,000 miles to the distance traveled.

THE WARBLER TRAVELS AT NIGHT, THE SWALLOW BY DAY

Why should the swallow elect so much more roundabout a route than that taken by the warbler? The explanation is simple. The warbler is a night migrant. Launching into the air soon after nightfall, it wings its way through the darkness toward some favorite lunch station, usually several hundred miles distant, where it rests and feeds for several days before undertaking the next stage of its journey. Its migration consists of a series of long flights from one feeding place to the next, and naturally it takes the most direct course between stations, not deviating for any body of water that can be compassed at a single flight.

On the other hand, the swallow is a day migrant. Little and often is its rule. It begins its spring migration several weeks earlier than the warbler and catches each day's rations of flying insects during a few hours of slow evolutions, which at the same time accomplish



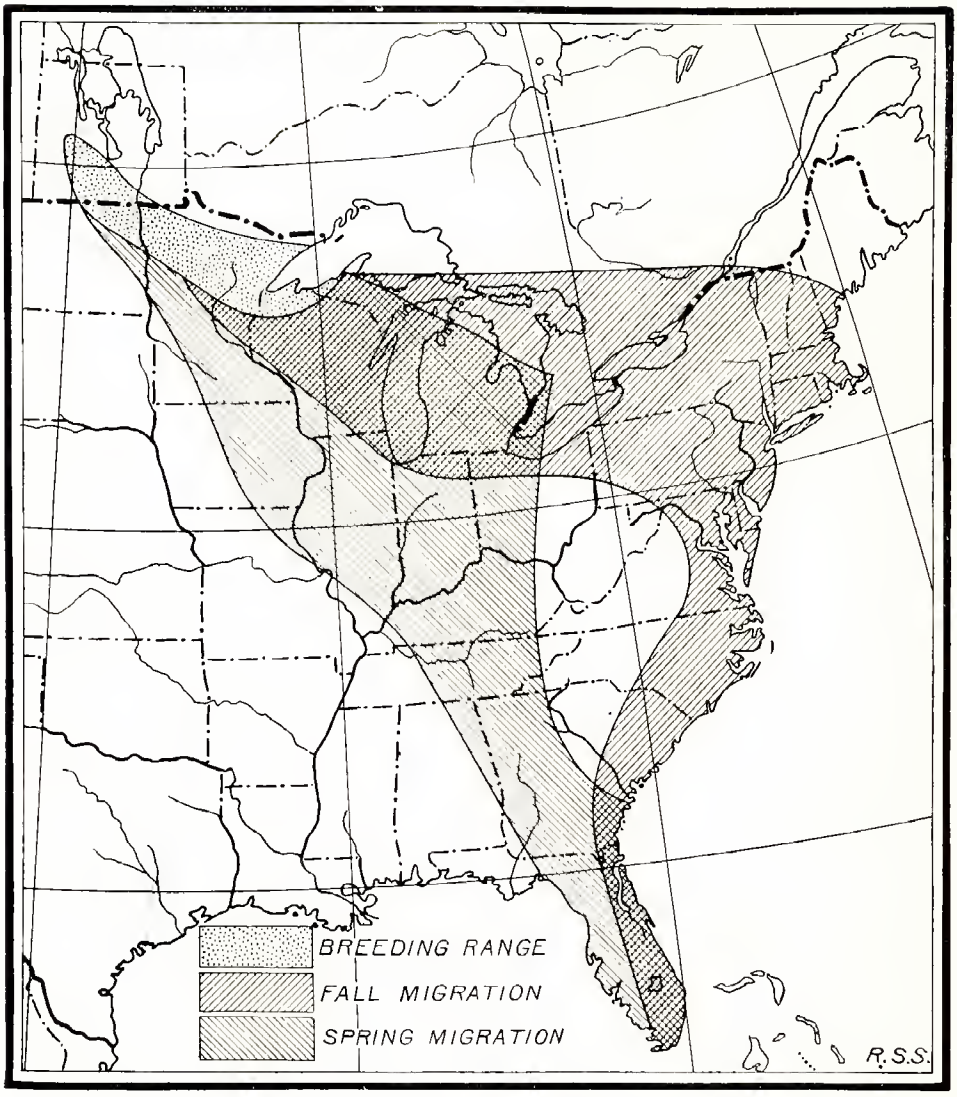
TWO OF THE PRINCIPAL MIGRATION ROUTES OF THE PALM WARBLER

They winter in the Gulf States from Louisiana eastward and throughout the Greater Antilles to Porto Rico. The Louisiana birds nest in Labrador, and those from the Antilles cut diagonally across the United States to summer in central Canada. The two routes cross each other in Georgia at approximately right angles.

the work of migration. It keeps along the insect-teeming shores, and the 2,000 extra miles thereby added to the migration route are but a tithe of the distance covered in pursuit of its daily food.

IDIOSYNCRASIES IN MIGRATION ROUTES

How migrating birds find their way over the widespread regions lying between their winter and summer homes has always been one of the tantalizing



THE CONNECTICUT WARBLER CHOOSES A DIFFERENT ROUTE TO RETURN TO ITS WINTER HOME THAN IT USED WHEN LEAVING IN SPRING (SEE PAGE 355)

problems of the migration student. A favorite theory of the past, and one still claiming many advocates, is that river valleys and mountain chains form convenient highways along which the birds travel in the spring, and which are easily recognized on the return trip.

The incorrectness of this theory (at least with reference to some species) is proven by the migration routes of the palm warblers. They winter in the Gulf States from Louisiana eastward and throughout the Greater Antilles to Porto Rico. They nest in Canada from the Mackenzie Valley to Newfoundland. To carry out the above theory, the Louisiana

THE LONGEST SINGLE FLIGHT MADE BY ANY BIRD—2,500 MILES ACROSS THE OCEAN FROM NOVA SCOTIA TO SOUTH AMERICA

This map shows the migration route of the golden plover, which uses a different course on its return from its winter home (see page 355)

palm warblers should follow up the broad, open highway of the Mississippi River to its source and go thence to their breeding grounds, while the warblers of the Antilles should use the Alleghany Mountains as a convenient guide.

As a matter of fact, as shown on the map (page 352), the Louisiana birds nest in Labrador, and those from the Antilles cut diagonally across the United States to summer in central Canada. The two routes cross each other in Georgia at approximately right angles.

Another idiosyncrasy of bird migration is the adoption by the Connecticut warbler of different routes for its southward and northward journeys. All the individuals of this species winter in South America, and, as far as known, all go and come by the same direct route between Florida and South America, across the West Indies; but north of Florida the spring and fall routes diverge. The spring route (page 353) leads the birds up the Mississippi Valley to their summer home in southern Canada; but fall migration begins with a 1,000-mile trip almost due east to New England, whence the coast is followed southwest to Florida.

The Connecticut warbler is considered rare, but the multitudes that have struck the Long Island light-houses during October storms show how closely the birds follow the coast-line during fall migration.

The map represents the spring-migration route as far as at present known. The fact that the route is practically north and south through Ohio and then turns abruptly west indicates a large and as yet undiscovered breeding area in Ontario north of lakes Huron and Superior. Indeed, so little is known about the nesting of the Connecticut warbler that the eggs obtained by Mr. Seaton more than 25 years ago still remain unique.

Incidentally this route of the Connecticut warbler is a conclusive argument against the theory that migration routes indicate the original pioneer path by which the birds invaded the region of their present summer homes.

THE LONGEST CONTINUOUS FLIGHT IN THE WORLD—2,500 MILES

Such elliptical migration routes as that mentioned above are rare among land birds, but are used and on a far larger scale by many water birds, notable among which is the golden plover. This species nests along the Arctic coast of North America, and as soon as the young are old enough to care for themselves fall migration is begun by a trip to the Labrador coast, where the plover fattens for several weeks on the abundant native fruits. A short trip across the Gulf of St. Lawrence brings it to Nova Scotia, the starting point for its extraordinary ocean flight, due south to the coast of South America (page 354).

The golden plover takes a straight course across the ocean, and, if the weather is propitious, makes the whole 2,400 miles without pause or rest. But if tempests arise, it may be blown out of its course to the New England coast and start anew on the advent of fair weather; or it may rest for a few days at the Bermudas, one-third of the way along its course, or at the nearest of the Lesser Antilles, still 600 miles from the mainland of South America. These, however, are emergency stop-overs, to be resorted to only in case of storms. Having accomplished its ocean voyage, it passes across eastern South America to its winter home in Argentina.

After a six months' vacation here, the plover finds its way back to the Arctic by an entirely different route. It travels across northwestern South America and the Gulf of Mexico, reaching the United States along the coasts of Louisiana and Texas. Thence it moves slowly up the Mississippi Valley and by early June is again at the nesting site on the Arctic coast. Its round trip has taken the form of an enormous ellipse, with a minor axis of 2,000 miles and a major axis stretching 8,000 miles from Arctic America to Argentina.

HOW DID THE GOLDEN PLOVER COME TO USE SUCH A DIFFICULT ROUTE?

The evolution of the elliptical route of the golden plover, wonderful though it is in its present extended form, is easily traced through its various stages. Toward the end of the glacial era, when the ice began to recede, the peninsula of Florida was submerged and a comparatively small area of land in the southeastern United States was free from ice. Any golden plover that attempted to follow up the retreating ice must have been confined to an all-land route from Central America through Mexico and Texas to the western part of the Mississippi Valley. As larger areas of the eastern United States were uncovered and became available for bird habitation, extension of the route would be to the northeast, until in time the whole of the Mississippi Valley to the Great Lakes could be occupied.

As the migration route lengthened and powers of flight developed, there would arise a tendency to straighten the line and shorten it by cutting off some of the great curve (No. 1, page 357) through Texas and Mexico. A short flight across the western end of the Gulf of Mexico was finally essayed (No. 2), and this gradually lengthened and its points of departure and arrival moved eastward until eventually the roundabout curve through Texas was discarded and the flight was made directly from southern Louisiana across the Gulf (No. 3).

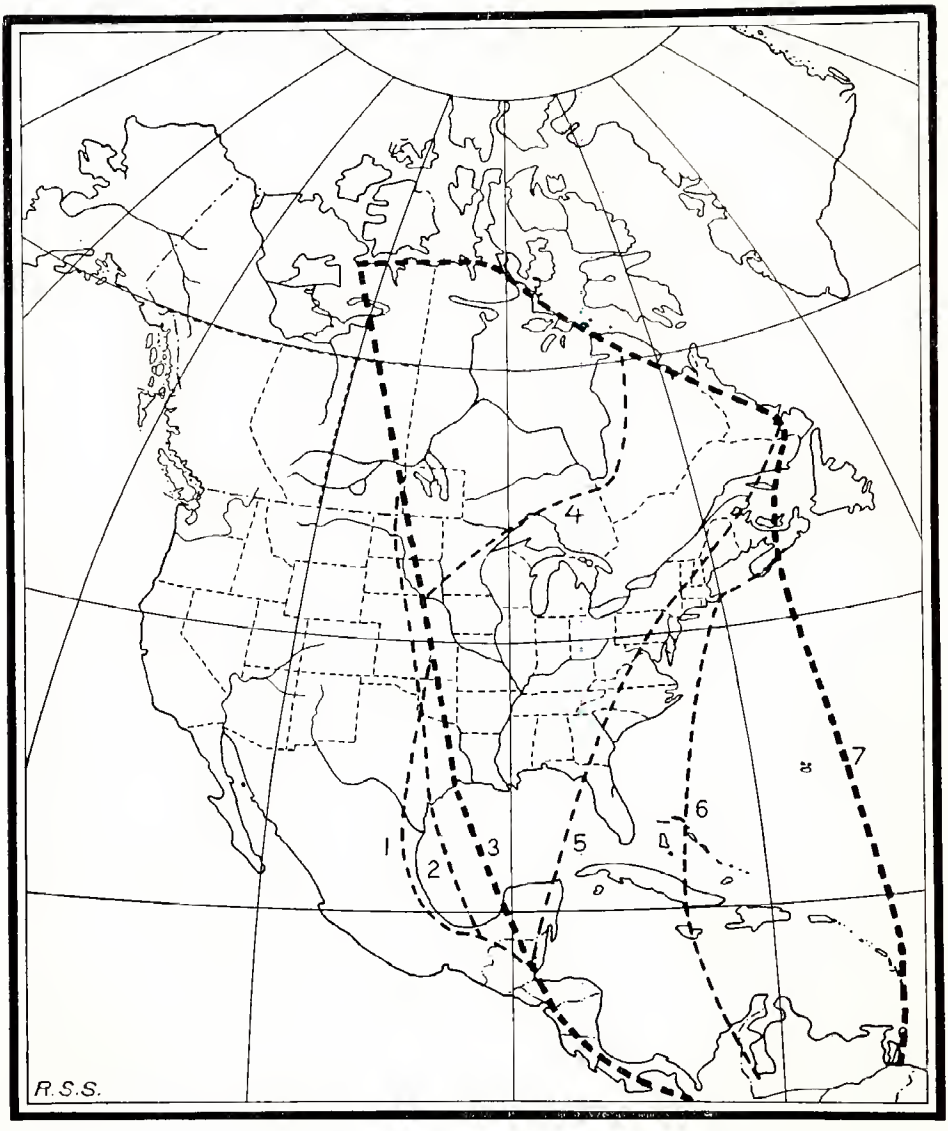
As the great areas of Canada were added to the birds' domain, other conditions arose. Here appeared a vast new stretch of coast and plain—the Labrador peninsula—offering in the fall rich stores of the most delectable berries and fruits; but at migrating time, in the spring, bound by frost and shrouded in fog. Since Chinook winds made the climate of the interior of the continent just east of the Rocky Mountains especially favorable for spring migration, there arose gradually a dividing of the spring and fall routes, the fall route tending eastward (No. 4), while the spring route remained unchanged. When the fall route had worked eastward to the Gulf of St. Lawrence (No. 5), a shortening began to take out the great westward curve of the New England coast. A short ocean flight was attempted (No. 6); and, when this proved successful, it was extended until the present direct route (No. 7) across the Atlantic was obtained.

HOW DOES THE PLOVER FIND ITS WAY EVERY SEASON TO THE LITTLE HAWAIIAN ISLANDS, 2,400 MILES ACROSS THE OCEAN?

The above gives a probable and fairly satisfactory explanation of the origin of the present migration route of the golden plover over the Atlantic Ocean. But this is a very simple problem compared with that presented by the Pacific golden plover. The Hawaiian Islands are in the middle of the Pacific Ocean, distant 2,000 miles from California on the east, 2,400 miles from Alaska on the north, and 3,700 miles from Japan to the west. Golden plover in considerable numbers fly each fall the 2,400 miles across an islandless sea from Alaska to Hawaii, spend the winter there, and fly back again the next spring to nest in Alaska. But how did they first find their way to Hawaii?

It is not to be supposed that any birds would deliberately strike out over unknown seas hunting for a new winter home. It is scarcely more probable that, even if a large flock was caught in a storm and carried far out of its course to the Hawaiian shores, the birds would change in a single season habits of countless generations and start at once a radically new migration route. It has already been said that present migration routes are evolutions—age-long modifications of other routes. The problem, then, is to find some migration route from which the golden plover's present Hawaiian-Alaskan route could have been easily and naturally derived.

The bird breeds on the northern shores of eastern Siberia, from the Liakof Islands to Bering Strait, and on the Alaska side of the strait south to the northern



MAP SHOWING THE EVOLUTION OF THE PRESENT MIGRATION ROUTE OF THE GOLDEN PLOVER (SEE PAGE 356)

base of the Alaska peninsula (page 359). It winters on the mainland of southeastern Asia, in the eastern half of Australia, and throughout the islands of Oceanica, from Formosa and the Liu Kiu Islands on the northwest to the Low Archipelago in the southeast.

The breeding range has an east-and-west extension of about 1,700 miles, while the winter home extends nearly half around the globe—10,000 miles—from India to the Low Archipelago. Undoubtedly the original migration route was approximately north and south, be-

tween the nests in Siberia and the winter resorts in southern Asia. In the course of time the species spread eastward in the winter to Australia, to the islands along the eastern coast of Asia, and throughout Oceanica, while at the same time the breeding range was extended eastward across Bering Strait to Alaska.

If all these extensions took place before there was any cutting off of corners in the migration route, then at this stage of development the Alaska-breeding birds were journeying over 11,000 miles (page 359, No. 1) to reach the Low Archipelago, distant only a little more than 5,000 miles in an air-line.

It is fair to suppose that early in the course of the eastward extension among the Pacific islands, the plover began to shorten the roundabout journey by flights from the northern islands to eastern Asia, and finally to Japan (No. 2). The most northern island is Palmyra, and the flight from there westward to the nearest of the Marshall Islands is about 2,000 miles; thence a 3,000-mile journey, with several possible rests, brings the birds to Japan.

It is easily possible that birds accustomed to this 5,000-mile flight might be driven by storms a thousand miles out of their course and discover Hawaii. When from Hawaii they attempted to reach Japan (No. 3) they would find a chain of islands stretching for 1,700 miles in the desired direction, and the final flight of 2,000 miles from the last of these—the Midway Islands—to Japan would be no longer than previous flights to which they had become accustomed.

Having once learned the route from the Midway Islands to Japan, it would be natural that the place of alighting on the Asiatic coast should be gradually carried north and east until the direct flight was made from the Midway Islands to the Aleutians (No. 4). A natural and easy carrying of this line eastward would result in the present route (No. 5) between Hawaii and Alaska.

NEIGHBORS AND STRANGERS

Both the American and Pacific golden plovers nest in Alaska near Bering Strait, the former on the north and the latter on the south side of the strait. The American bird reached there by a westward extension from Canada, and the Pacific by an eastward extension from Siberia. The birds themselves are so nearly alike that only an expert can distinguish them; and, notwithstanding they are such near neighbors during the summer—scarcely a hundred miles apart—the beginning of migration makes them utter strangers; for those north of the strait travel 3,000 miles east and then 6,000 miles south to Argentina, while the others make a 3,000-mile flight directly south to their winter home in Hawaii.

THE WORLD'S MOST EXTRAORDINARY TRAVELER

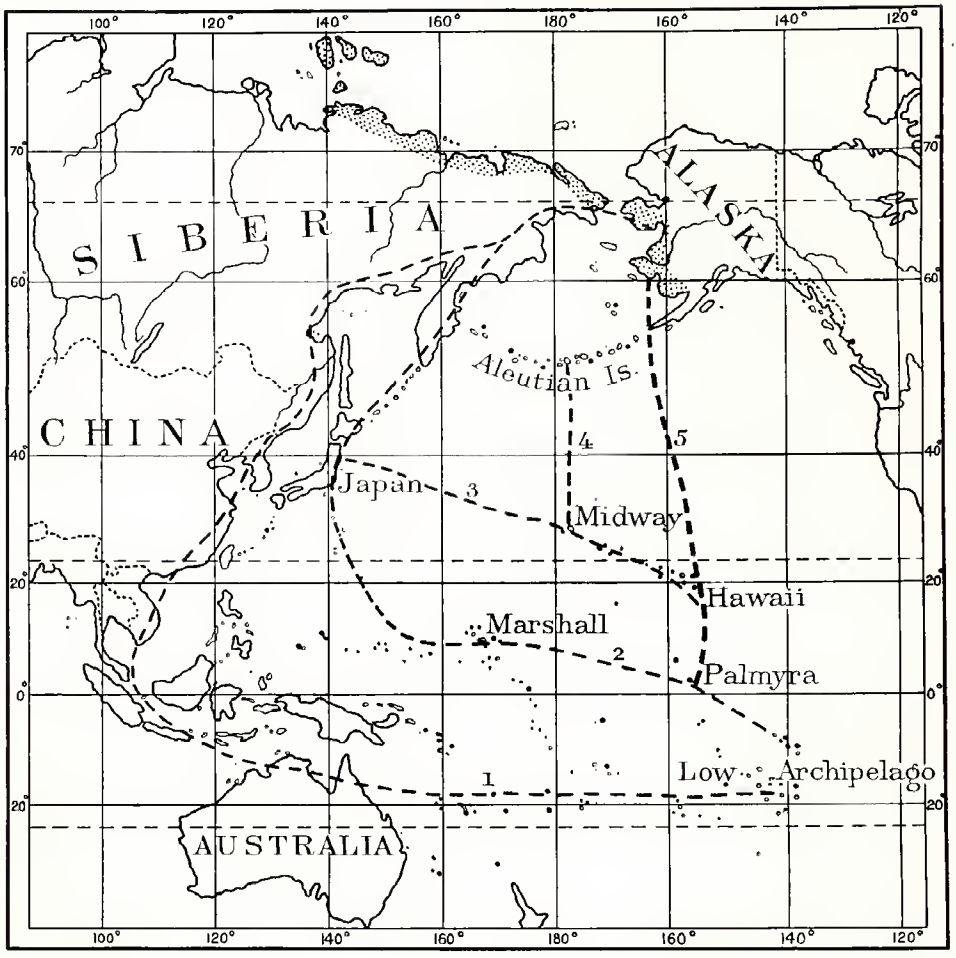
The shore-birds, such as the golden plover, present the longest migration routes among land-feeding birds; but even their surprising records are surpassed by some of the birds which glean their living from the waters. The world's migration champion is the Arctic tern (page 360). It deserves its title of Arctic, for it nests as far north as land has been discovered; that is, as far north as the bird can find anything stable on which to construct its nest.

Indeed, so Arctic are the conditions under which it breeds that the first nest found by man in this region, only 7½ degrees from the pole, contained a downy chick surrounded by a wall of newly fallen snow that had been scooped out of the nest by the parent.

When the young are full grown the entire family leaves the Arctics, and several months later they are found skirting the edge of the Antarctic continent.

What their track is over that 11,000 miles of intervening space no one knows. A few scattered individuals have been noted along the United States coast south to Long Island, but the great flocks of thousands and thousands of these terns which alternate from one pole to the other have never been met by any trained ornithologist competent to learn their preferred path and their time schedule.

The Arctic terns arrive in the far north about June 15 and leave about August



MAP TO EXPLAIN HOW THE GOLDEN PLOVER IS ABLE TO NAVIGATE TO THE HAWAIIAN ISLANDS IN THE MID-PACIFIC (SEE PAGES 356 AND 358)

The longest ocean trip without any possibility of resting is shown in this map. This is the same distance as traversed by the Atlantic plover, but the latter can get to land when in trouble. The dotted lines along the Arctic coast show the breeding range of the bird.

25, thus staying 14 weeks at the nesting site. They probably spend a few weeks longer in the winter than in the summer home; and, if so, this leaves them scarcely 20 weeks for the round trip of 22,000 miles. Not less than 150 miles in a straight line must be their daily task, and this is undoubtedly multiplied several times by their zigzag twistings and turnings in pursuit of food.

The Arctic terns have more hours of daylight and sunlight than any other animals on the globe. At their most northern nesting site, the midnight sun has already appeared before their arrival, and it never sets during their entire stay at the breeding grounds. During two months of their sojourn in the Antarctic they do not see a sunset, and for the rest of the time the sun dips only a little

MAP SHOWING SUMMER AND WINTER HOMES OF THE BIRD THAT HATES DARKNESS

The summer home of the Arctic tern is along the Arctic coast of North America; its winter home within the Antarctic Circle, 11,000 miles away. During eight months of the year the bird lives where the sun does not go below the horizon. The track of the tern in its round journey of 22,000 miles is unknown (see page 359).

way below the horizon and broad daylight continues all night. The birds therefore have 24 hours of daylight for at least eight months in the year, and during the other four months have considerably more daylight than darkness.

THE MOVEMENTS OF THE ROBIN

The number of miles traveled per day by a migrating bird varies greatly in different parts of the migration journey. These variations are intimately connected with corresponding variations in the speed of the northward march of spring, and are based primarily on two facts: First, that the interior of a continent warms up faster than the coasts; second, that spring is hastened in western North America by the Japan current, while it is as decidedly retarded in the east by the polar current.

The results of these two causes are strikingly shown in the migration of the robin (page 362). This bird differs from most others in that throughout its entire course northward it adopts spring's timetable for its own.

The robin's average temperature of migration is 35° F.; that is, it puts in an appearance soon after the snow begins to melt and streams to open, but before vegetation has made any start. These conditions occur in the central Mississippi Valley about the middle of February, and it is the first of March before spring and the robins cross northern Missouri and arrive together in southern Iowa. Thence a whole month is consumed by the birds in their slow progress — 13 miles a day — to central Minnesota. There their pace quickens, to keep up with the northward rush of spring, and another 10 days at doubled speed brings them to southern Canada.

Here they must make an important choice. To the north and northeast lies a land that awakens slowly from its winter's sleep, and where the sun must wage a protracted contest against the cold of the ice-masses in Lake Superior and Hudson Bay. To the northwest stretches a less forbidding region, already quickening under the influence of the Chinook winds.

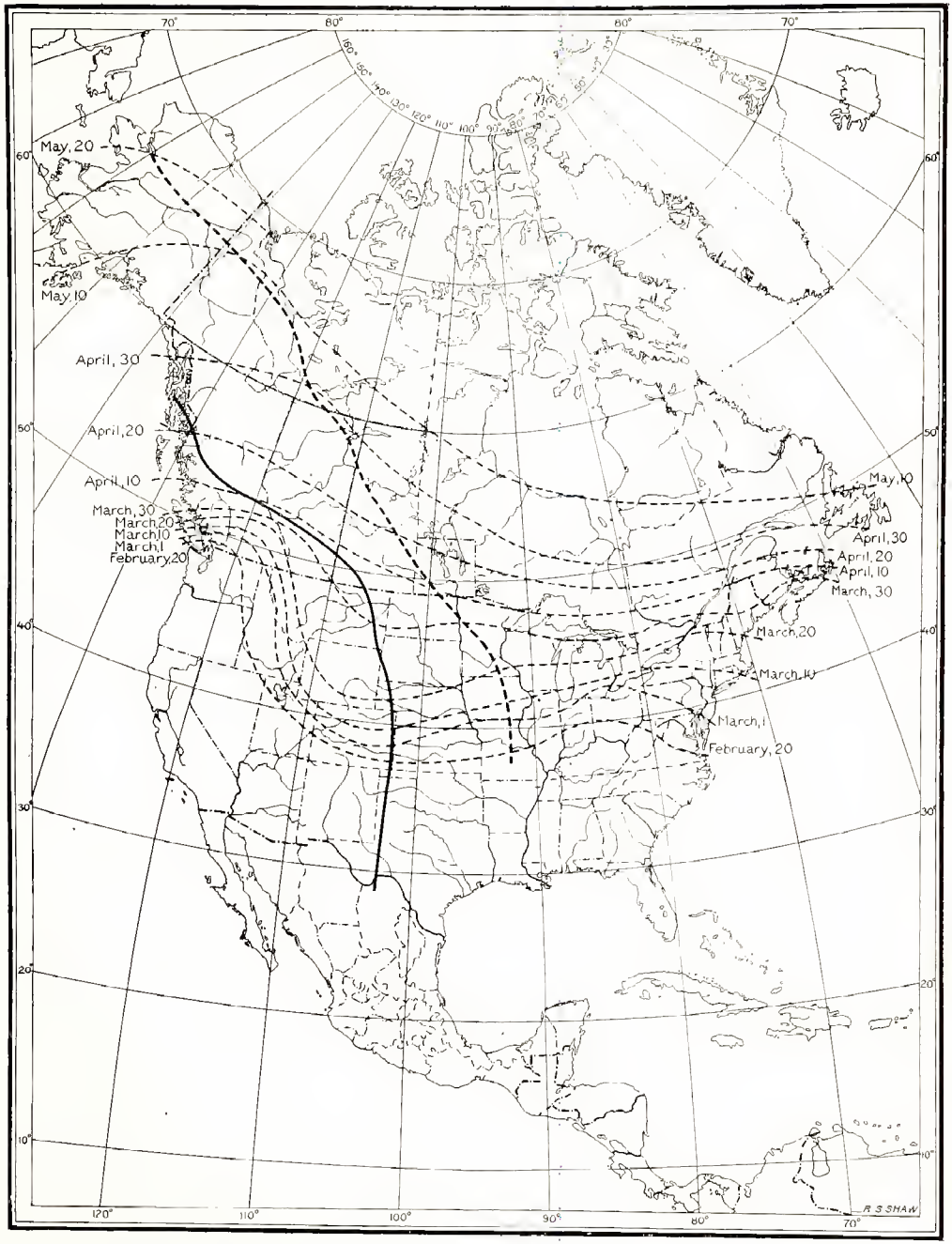
THE EASTERN ROBINS MOVE SLOWLY, THE PACIFIC MUCH FASTER

Most of the robins from Missouri that pass through western Minnesota elect to turn to the northwest, and now they must not only keep pace with the rapidly advancing season, but must do so while traveling on a long-drawn-out diagonal. Their daily average rises to 50 miles—four times that in southern Iowa—and later, when for the birds bound for western Alaska the course becomes nearly due west, the rate increases to 70 miles a day—more than six times the speed with which the journey began.

The migration map of the robins shows that these Alaska-breeding birds are the only ones that develop high speed. The robins bound for Newfoundland move leisurely along the Atlantic coast at the proverbially slow rate of the oncoming of spring in New England, and, scarcely exceeding 17 miles a day, they finally arrive at their destination May 6, when their Alaska-bound relatives are already 1,200 miles farther north.

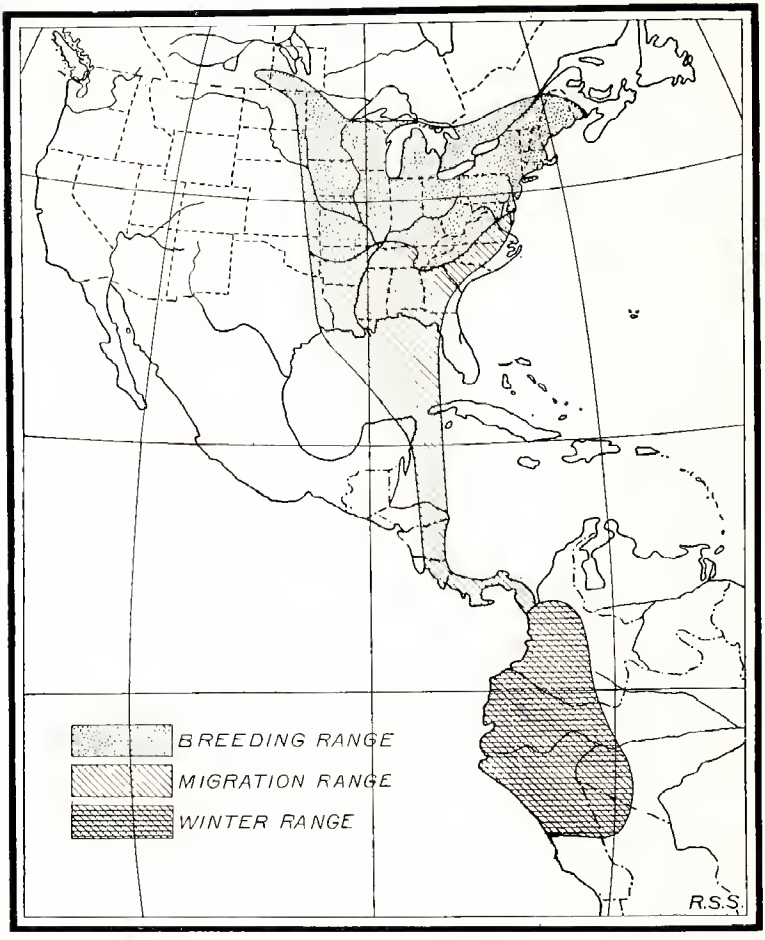
One of the most interesting things indicated on the map is the migration route of the robins who nest in southern Alberta. They arrive too early to have come from the south or the southeast; hence they must have come from the southwest, though this has necessitated their crossing the main range of the Rockies while the mountains were still in the grasp of winter. Robins remain all winter on the Pacific coast, north to southwestern British Columbia, which has about the same winter temperature as St. Louis, 700 miles southward. Hence the wintering robins of British Columbia are already far north at the advent of spring and do not need any hurried migration to reach Alberta on time. As a fact, they average only 8 miles a day, the slowest rate for the species.

It may be fairly asked, How do we know that the Alaska robins have come all this long distance from the central Mississippi Valley, instead of the far shorter distance from British Columbia? It happens that the robins of the two sides of the continent are slightly differ-



THE ROBIN MOVES MUCH QUICKER ON THE PACIFIC THAN ON THE ATLANTIC

The dotted lines connect the places at which the robins arrive simultaneously. The heavy solid line marks the division between the eastern and the western forms. The heavy dotted line represents the migration route of the Alaska breeding birds (see page 361).



THE SCARLET TANAGER

An example of a migration route much more contracted than either the breeding or winter range (see page 364)

ent in color and in pattern of coloration. Birds of the western style are not known north of southwestern Saskatchewan, central British Columbia, and southeastern Alaska, while the whole country to the northward is occupied by birds that evidently have come from the southeast. The heavy, solid line on the map shows the approximate meeting-ground of the two forms.

Most migrants except the robins, ducks, and geese wait in their warm winter quarters until springtime is far advanced, and then, traveling swiftly, occupy only a few days in their vernal migration. The black-poll warbler is one of the best examples.

THE WARBLERS AND CLIFF SWALLOWS

While the Alaska-breeding robins start off in February, and spend nearly 90 days in going from central Missouri to western Alaska, the black-poll warbler remains in his tropical home during February and March, and is not seen in southern Florida until about April 20.

By the first of May he arrives in central Missouri, which the robins left 60 days earlier, and yet he reaches northwestern Alaska only 10 days later than the robins. The latters' 90-day schedule has been shortened by the warbler to 30 days.

The black-poll warbler furnishes a striking example of speed acceleration during the latter part of migration. As indicated on the map of his migration route (page 348), between April 20 and April 30 he goes from central Missouri to central Iowa, a distance of 300 miles, or an average of 30 miles a day. The next 10 days the rate rises to 100 miles a day, while during the last few days of migration a velocity of 300 miles a day is attained.

In contrast, notice the dates, distances, and speeds indicated for the cliff swallow on its migration-route map (page 349). The swallow must strike out for the north very early, since by March 10 it is already 2,500 miles from the winter home, and yet is averaging only 25 miles a day for the next 20 days, while it is rounding the western end of the Gulf of Mexico. It more than doubles this rate while passing up the Mississippi and Ohio rivers. The crossing of the Alleghany Mountains comes next, and there are only 200 miles of progress to show for the 10 days of migration. By this time spring has really come east of the Alleghanies, and the swallow travels 60 miles a day to its summer home in Nova Scotia.

It is to be noted that the swallow, like the robin and the black-poll warbler, works up to high rates of speed when it is traveling on a diagonal, and that except during the 10 days spent in crossing the mountains, each 10 days' travel covers approximately five degrees of latitude.

SOME NARROW MIGRATION ROUTES

The accompanying illustration of the range of the scarlet tanager (page 363) is given to show the narrowness of the migration route as compared with the width of the summer and winter homes. This tanager nests from New Brunswick to Saskatchewan, a region extending over 1,900 miles of longitude. The Mississippi Valley birds go south and the New England birds southeast, until they all leave the United States along 800 miles of Gulf coast from Texas to Florida. The migration lines continue to converge until in southern Central America they are not more than a hundred miles apart. Arrived in South America for the winter, the birds scatter over a district about one-half the area of the summer home, with an extreme east-and-west range of about 700 miles.

THE BOBOLINKS ARE SEEKING NEW ROUTES

The migration route of the bobolink (page 365) shows a similar though not so decided a contraction at its narrowest part. The summer home extends from Cape Breton Island to Saskatchewan, 2,300 miles, and the migration lines converge toward the rice fields of the South, the objective point of all bobolinks, no matter where they nest.

Having gorged themselves to repletion, they press on toward their Brazilian winter abode; but the South Carolina and Georgia birds take a course almost at right angles to that chosen by the scarlet tanagers from those States, and strike out directly across the West Indies for South America. In this part of their journey their migration path contracts to an east-and-west breadth of about 800 miles, while a very large proportion of the birds restrict themselves to the eastern 400 miles of this route. In South America, the region occupied during the winter has about one-fifth the breadth and one-third the area of the breeding range.

The bobolinks of New England have witnessed great numerical changes, or evolutions. When the white man arrived on the scene, nearly all of New England was covered by primeval forest and bobolink meadows were scarce. As the forest gave place to hay-fields, the bobolinks promptly took advantage of their chance and their numbers increased steadily until the maximum was reached some 40 years

THE MIGRATION ROUTE OF THE BOBOLINK IS CHANGING (SEE PAGE 364)

ago. Then the newly invented mowing machine and the horsepower hay-rake began to destroy thousands of nests and caused a marked diminution in the bobolink census.

The case of the bobolink is a fitting close to this article, because it is revealing to us at the present time the manner of evolution of a new migration route. By nature a lover of damp meadows, it was formerly cut off from the western United States by the intervening arid region. But with the advent of irrigation and the bringing of large areas under cultivation, little colonies of nesting bobolinks are beginning to appear here and there almost to the Pacific. Some of them are shown by dots on the accompanying map, and the probability is that the not distant future will see a large increase in these trans-Rocky Mountain bobolinks.